DOCUMENT RESUME

ED 254 156 HE 018 121

TITLE	Technical Specifications for Conducting an Annual Assessment of Overall Payment Error in the Pell Grant Program.
INSTITUTION	Advanced Technology, Inc., Reston, VA.
SPONS AGENCY	Office of Student Financial Assistance (ED), Washington, DC.
PUB DATE	Feb 83
CONTRACT	300-80-0952
NOTE	257p.; For related documents, see HE 018 112-135 and HE 018 137-140.
PUB TYPE	Guides - Non-Classroom Use (055) -- Reports - Descriptive (141)
EDRS PRICE	MF01/PC11 Plus Postage.
DESCRIPTORS	*Accountability; Compliance (Legal); Costs; Databases; *Data Collection; Data Processing; Delivery Systems; *Error Patterns; *Federal Aid; Federal Regulation; Grants; Guidelines; Higher Education; Information Needs; *Need Analysis (Student Financial Aid); Program Evaluation; Quality Control; Research Design; Sampling; Statistical Analysis; *Student Financial Aid
IDENTIFIERS	*Pell Grant Program; Validation Verification and Testing Techniques

ABSTRACT

The issues, options, and procedures for annually measuring overall payment error in the Pell Grant program are specified in detail. Guidelines for establishing a definition of Pell Grant payment error are provided, and the design issues related to error measurement are examined. A comparison is made of options for selecting a study sample and for collecting data required to measure payment error. Data collection procedures are specified in detail, along with procedures needed to create a study database from the collected data. Guidelines for data analysis are also included. The correct award to students is based on such factors as enrollment status and student costs. Error measurement in the Pell program involves time-related research design factors, all of which must be understood when planning the data collection effort and when analyzing the data. Data collection activities are outlined for sample selection, student/parent interviewing, collecting hardcopy secondary data, and collecting data from institutions. Tasks and procedures required to create the database include: receipt of data, editing and coding, data entry, machine edit and updating, reformatting files for analysis package, producing marginal tabulations, merging data files, and reviewing case for quality control. Appended are: a glossary; a description of measurement tolerances of error in the program; algebraic specifications of error measures; and an estimate of requirements for conducting an assessment of overall payment error in the Pell Grant program. (SW)

ED254156

TECHNICAL SPECIFICATIONS FOR CONDUCTING AN ANNUAL ASSESSMENT OF OVERALL PAYMENT ERROR IN THE PELL GRANT PROGRAM

Submitted to

OFFICE OF STUDENT FINANCIAL ASSISTANCE
DEPARTMENT OF EDUCATION

CONTRACT NO. 300-80-0952

FEBRUARY 1983

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HE018121

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The Office of Student Financial Assistance (OSFA) of the Department of Education has contracted with Advanced Technology, Inc. of McLean, Virginia, and its subcontractor, Westat, Inc. of Rockville, Maryland, to conduct a three-year quality control project (Contract No. 300-80-0952). The focus of the project is the Pell Grant Program, the larges of the student grant programs administered by OSFA. The objective of Stage Two (Part One) of the project is to design a quality control system to measure and analyze program performance. The reports completed to date under Stage Two (Part One) include:

Quality Control (QC) System Development for the Pell Grant Program: A Conceptual Framework	March, 1982
Action Plan for Quality Control System Design: A Working Paper	May, 1982
A Comparison of Title IV Student Assistance Delivery Systems	June, 1982
Preliminary Quality Control System Design for the Pell Grant Program	June, 1982
A Framework for a Quality Control System for Vendor/Processor Contracts	September, 1982
Technical Specifications for QC Systems Enhancements to the Manual GSL Interest Billing Process	November, 1982
Recommendations for Improving Quality in the Campus-Based Programs FISAP Process	December, 1982
Technical Specifications for Conducting an Annual Assessment of Overall Payment Error in the Pell Grant Program	February, 1983

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EXECUTIVE SUMMARY

Measuring total payment error in a social services program--particularly in the Pell Grant program--is a complex undertaking requiring a thorough understanding of the program itself and the various methodological issues involved. In this report, the issues, options, and procedures for annually measuring overall payment error in the Pell Grant program are specified in detail. The specifications developed here draw upon the experience gained in conducting a nationwide error study during Stage One of the current Pell Grant Quality Control project.

The organization of this report follows the logical sequence of a quality control study. After a brief introduction in Chapter 1, each chapter is devoted to a major study phase:

- Chapter 2 presents guidelines for establishing a definition of Pell Grant payment error and examines the critical design issues related to error measurement.
- Chapter 3 presents and compares options for selecting a study sample and collecting the data required to measure payment error.
- Chapter 4 specifies in detail the procedures required to collect the data.
- Chapter 5 specifies in detail the procedures required to create a study data base from the collected data.
- Chapter 6 provides guidelines for analyzing the collected and prepared data.

The following summarizes, by chapter, the general features of the specifications.

Chapter 2--Guidelines for Developing Measures of Error

- Overall payment error in the Pell program is defined as the difference between the amount which should have been awarded and the amount which was actually

disbursed. The correct amount is based on the true values for the application items, enrollment status, cost of attendance, and the other factors which determine a student's eligibility for a grant.

- Specification of operational definitions of payment error involves several serious methodological issues. It is important that analysts and policymakers understand each of these issues thoroughly when interpreting survey findings. Each of these issues revolves around the difference between "measured" error and "true" error. The issues include:

  - The distinction between investigatory and confirmatory measures of error

  - The distinction between errors of omission and errors of commission

  - The distinction between verifiable and nonverifiable evidence

- In order to identify corrective actions, it is desirable to decompose total payment error and allocate the resulting components to specific data elements and actors in the Pell Grant delivery system. Total payment error can be divided into two major components: error attributable to the student and error attributable to the institution. Both student and institutional error can be further divided into policy-relevant subcomponents, such as error attributable to student misreporting of income.

- Error measurement in the Pell program involves the following three types of time-related research design factors, all of which must be understood when planning the data collection effort and when analyzing the survey data:

  - The possible impact of the timing of data collection on the ability of students or parents to provide accurate documentation of application data

  - The impact of institutional validation and account reconciliation on grant accounts

  - The impact of Pell program procedures, from application processing edits to account reconciliation, on grant levels

- At a minimum, the following information must be collected on each sampled recipient in order to measure total payment error: (1) the actual Pell disbursement,

(2) the Student Aid Index (SAI) used to calculate the disbursement, (3) the cost of attendance, (4) the enrollment status (5) documentation that verifies the student's categorical eligibility for a Pell Grant, and (6) documentation that verifies application data. Items one through five must be collected from the institution and item six from the student and his or her parents and/or from agencies and organizations such as the IRS. If a "post-reconciliation" measure of error is desired, certain information may be collected from Program Information and Monitoring System (PIMS) records and from the computed applicant record maintained by the central application processor.

- There are two challenges to the validity of sample surveys: experimental bias and nonresponse bias. Analysts and policymakers must be aware of any bias when interpreting study findings. Assessing the existence of experimental bias requires collection of data from nonsampled students at selected institutions and from students of nonselected institutions.

Chapter 3--Data Collection and Sampling Alternatives

- Four options can be identified for collecting the data required to measure overall payment error:

  - Option 1: student record data would be collected by site visits to institutions, students and parents would be interviewed in person, and documentation would be collected by mail from the IRS and other agencies.

  - Option 2: would have the same features as Option 1 except that in-person interviews with students and parents would be replaced by telephone interviews.

  - Option 3: would be a scaled-down version of Options 1 and 2--no student and parent interviews would be conducted.

  - Option 4: would have no field work; all institutional and student/parent data would be collected by mail.

- Although all the options have points in their favor, Option 1 is the most desirable approach since, of the four, it would provide the most reliable error measures.

- Two options can be identified for selecting a nationally representative sample of recipients.

  - Option 1: secure a list of each institution's recipients and sample from each list at the study's main office.

  - Option 2: train field staff to draw a sample at each institution.

- The number of students who must be sampled depends on four factors: the degree of precision wanted for the statistical inferences derived from the data; the amount of confidence desired in these estimates; the degree of clustering to be used; and the degree of homogeneity within each cluster. The greater the precision desired, the larger the sample must be; likewise, the higher the confidence level desired, the larger the sample must be. Larger cluster sizes (i.e., the number of students at the same institution) make the institutional data collection more efficient, but there is a loss in accuracy. Higher levels of homogeneity among the students in each institution require larger samples for the same accuracy.

Chapter 4--Data Collection Specifications

- The tasks, subtasks, and procedures required for completing data collection Option 1 (site visits to institutions, in-person student/parent interviews, and collection of verifying documentation by mail) and sampling Option 1 (select sample at project office) follow:

  Task 1: Select Sample

  Task 1.1: Select Institution Sample
  1. Determine the Sampling Frame
  2. Stratify the Sampling Frame
  3. Cluster the Sampling Frame
  4. Determine the Size of the Sample
  5. Allocate the Sample among Strata and Clusters
  6. Draw the Sample

  Task 1.2: Select Student Sample
  1. Determine the Size of the Sample
  2. Determine the Sampling Frame
  3. Compile the Sampling Frame
  4. Stratify the Sampling Frame
  5. Draw the Sample

Task 2: Interview Students and Parents

Task 2.1: Develop Data Collection Instruments
1. Specify Measurements and Measurement Levels
2. List Data Needs
3. Collate Stage One Instruments
4. Evaluate the Stage One Instruments
5. Write Revised Draft Instruments
6. Test Instruments
7. Revise Instruments
8. Secure FEDAC Approval
9. Produce Final Instruments

Task 2.2: Recruit Interviewers
1. Determine Interviewer Qualifications
2. Determine Number of Interviewers Needed
3. Determine Distribution of Interviewers
4 Recruit Applicants
5. Screen and Interview Applicants

Task 2.3: Train Interviewers
1. Develop Training Manuals
2. Schedule Training and Notify Interviewers
3. Send Training Material to Interviewers
4. Train Field Supervisors
5. Train Interviewers

Task 2.4: Contact Students and Parents
1. Draft Letters and Forms
2. Compile Mailing List
3. Send Letters and Forms

Task 2.5: Conduct Interviews
1. Assign Students and Parents to Interviewers
2. Schedule Interviewers
3. Deal with Refusals and Avoiders
4. Conduct Interviews
5. Edit Questionnaires
6. Return Questionnaires

Task 2.6: Implement Quality Control and Supervision Plan
1. Coordinate Interviewers
2. Edit Questionnaires
3. Verify Interviews
4. Supervise Interviewers
5. Assign New Cases
6. Control Expenses

Task 2.7: Follow up by Telephone
1. Send Instruments to Telephone Station
2. Telephone Respondent or Interviewer
3. Code Response

Task 3: Collect Secondary Data

Task 3.1: Collect Hardcopy Secondary Data
1. Request SARs from Institutions
2. Telephone Institutions That Do Not Respond
3. Review and Key Enter SAR Data
4. Send Release Forms and Other Information to Students and Parents
5. Telephone Students and Parents That Do Not Respond
6. Obtain IRS Forms
7. Obtain Tax Assessor Records
8. Obtain Documentation from Financial Institutions
9. Obtain Documentation from Public Assistance Offices

Task 3.2: Conduct IRS Tape Match
1. Create Tape to Submit to IRS
2. Submit Tape and Release Forms to IRS
3. Merge Returned IRS Tape with Study Data

Task 4: Collect Data from Institutions

Task 4.1: Develop Data Collection Instruments
1. Design First Draft of Instruments
2. Develop Other Data Collection Materials
3. Contact Institutions for Field Test
4. Conduct Field Test
5. Revise Data Collection Instruments
6. Conduct Second Field Test
7. Revise Data Collection Instruments
8. Prepare and Submit Clearance Package

Task 4.2: Schedule Site Visits
1. Send Initial Contact Letter to Institutions
2. Send Second Letter to Financial Aid Officers
3. Recontact Institutions that Fail to Submit Recipient List
4. Construct Initial Master Site Visit Schedule
5. Telephone Institutions to Arrange Visits
6. Adjust Site Visit Schedule As Necessary

Task 4.3: Recruit Field Representatives
1. Advertise for Financial Aid Professionals
2. Interview by Phone
3. Interview in Person

Task 4.4: Train Field Representatives
1. Develop Training Manuals
2. Contact Institutions to Arrange Field Practice
3. Mail Training Manual to Field Representatives
4. Conduct Training Session

Task 4.5: Conduct Site Visits
1. Prepare for the Site Visit
2. Meet with Financial Aid Director
3. Complete File Abstracts
4. Complete Control Group Forms
5. Conduct Exit Interview
6. Edit Completed Instruments
7. Complete Transmittal Form
8. Bundle Data and Insert in Pre-Addressed Mailer
9. Seal, Tape, and Mail Data Package
10. Record Mailing Data and Location in Notebook
11. Call Supervisors

Task 4.6: Implement Quality Control and Supervision Plan
1. Send Periodic Memoranda
2. Establish Telephone Schedules
3. Validate the Field Representative's Work
4. Observe Field Representatives On-Site

Task 4.7: Follow up by Telephone
1. Telephone Field Representative or Institution
2. Code Instrument

Task 4.8: Debrief Field Representatives
1. Plan One-day Debriefing Session
2. Conduct Debriefing Session

Chapter 5--Data Preparation Specifications

- The tasks and procedures required to create the study data base follow:

Task 1: Receive Data
1. Record on Master Control Log
2. Log onto Respondent Control File

3. Scan Edit
4. Batch
5. Record on Master Control Log and Batch Control Log

Task 2: Edit and Code
1. Code
2. Edit
3. Conduct Quality Control Check

Task 3: Key Enter
1. Key Enter
2. Key Verify

Task 4: Machine Edit and Update
1. Run Edit Program on Keyed Data
2. Resolve Edit Failures
3. Update File
4. Repeat Edit Process Until File Is "Clean"
5. Run Edit Program to Ensure Completeness of Data

Task 5: Reformat Files for Analysis Package
1. Create SAS File
2. Assign Variable Labels

Task 6: Produce Marginal Tabulations
1. Produce Statistics
2. Review

Task 7: Merge Data Files
1. Code Dependency and Marital Status
2. Prioritize Data
3. Merge Files
4. Compute SAI and Award

Task 8: Conduct Quality Control Case Review
1. Select Sample
2. Review and Update

Chapter 6--Guidelines for Conducting Data Analysis

- Rules for including cases in summary statistical runs should be specified. These rules should address the following issues:
  - Inclusion or deletion of cases where no Pell disbursements are recorded
  - Inclusion or deletion of cases where data collection is incomplete
  - Inclusion or deletion of cases where verification data is incomplete

- The most important descriptive statistics to be produced are the univariate statistics which show the incidence and general form of overall payment error. Standard statistical software packages are able to generate frequency distributions and other univariate statistics and graphic representations of univariate distributions.

- The first step in investigating the causes of payment error is to determine whether specific student, institution, or program characteristics are associated with the incidence or size of payment errors. Bivariate analyses--two-way tables and statistics measuring the strength of association between two variables--can be extremely useful in both answering questions about specific relationships and in exploratory data analysis.

- Multivariate analysis is designed to address more complicated questions of relationships between error and characteristics of students, families, and institutions than is bivariate analysis. Three purposes can be served by multivariate analysis:

  - Testing of a priori hypotheses

  - Exploratory data analysis

  - Error-prone modeling

  Hypothesis testing is a methodological approach where hypotheses and theories are subjected to real world data in order to confirm or reject these hypotheses. Exploratory analysis, on the other hand, uses the real world data to develop the hypotheses and theories. Error-prone modeling is a form of exploratory analysis; however, it differs from the other two in that its purpose is not to uncover relationships among variables but rather to split a sample into groups where the observations in a group have as similar error levels as possible while error levels across groups are as dissimilar as possible.

CHAPTER 1

INTRODUCTION

BACKGROUND

The Pell Grant program is the second largest student assistance program administered by the Office of Student Financial Assistance (OSFA). In the 1981-82 academic year over $2 billion were distributed to roughly 2.7 million students attending eligible postsecondary institutions. A program of this size carries with it significant management responsibilities. One of OSFA's major goals is to ensure that the Pell Grant program operates in an efficient manner, and that available resources are allocated properly to those students entitled to aid. Senior policymakers in Congress, the Office of Management and Budget (OMB), and the White House share the concern that Pell Grant funds be distributed in accordance with regulations and legislation.

Quality Control (QC)--detecting and reducing error--is essential for the Pell Grant program. One purpose of Stage Two of the current Pell Grant Quality Control project is to design a QC system to continuously measure and analyze Pell Grant program performance. As one component of this overall QC system[1], it is important that ED policymakers, OMB, and Congress be provided on a routine basis (at least annually) with a measure of overall payment error in the program as input to policy and legislative decisions.

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[1] Preliminary Quality Control System Design for the Pell Grant Program (Advanced Technology, 1982) provides a general design for all components in the Pell Grant QC system.

A QC study in 1978-79 and the 1980-81 study in Stage One of the current QC project provided such a comprehensive measure of Pell Grant payment error. The studies, however, were in essence "one-time-only" contracted efforts. Currently, OSFA has no on-going system for collecting and analyzing information on overall payment error. While OSFA's Division of Certification and Program Review (DCPR) performs a review function for all student aid programs, it gathers neither the type nor the quantity of information needed to accurately estimate total error in the program. In addition, OSFA receives and analyzes data from the Pell Grant application processor on application corrections made in response to system edits and to validation of application information by postsecondary institutions. These data, however, provide only a very rough notion of the scope of applicant misreporting and provide no measure of institutional error.

PURPOSE AND ORGANIZATION OF REPORT

Obtaining an accurate, overall measure of payment error in the Pell Grant delivery system is a complex undertaking. The purpose of this report is to define the issues, options, and procedures for annually attaining such a measure. The organization of this report follows the logical sequence of a QC study. In Chapter 2, guidelines for establishing a definition of payment error are presented. Various methodological issues are discussed including the distinction between confirmatory and investigatory measurements, the measurement of errors of commission and omission, and the relationship between time of data collection in the

Pell Grant delivery cycle and measurement of error. In Chapter 3, four possible approaches for collecting the required data are analyzed. One of the four is recommended for an ongoing measurement system--a three-faceted approach which includes: (1) visits to postsecondary institutions; (2) in-person interviews of grant recipients and their parents; and (3) collection of documentation from various governmental agencies, tax assessors, and banks to verify student application information. Also in Chapter 3, alternatives for selecting a recipient sample are examined, and the relationship of recipient sample size to the precision of estimates about error and the amount of confidence one can have in those estimates is explored. In Chapter 4, specifications for collecting data using the approach recommended in Chapter 3 are set forth in detail. This chapter is essentially a manual for conducting data collection. Required tasks have been identified. For each task are first, a discussion of the rationale for the task and any important issues that need consideration in implementing the task and, second, a step-by-step list of required procedures. Chapter 5 provides detailed specifications for creating the study data base. As in Chapter 4, tasks and procedures are identified. Chapter 6 provides guidelines for analyzing the collected and prepared Pell Grant QC data. The appropriateness and usefulness of various analytical techniques are considered. In addition, a glossary in Appendix A defines terms as they are used in this report. The reader may find it useful to scan the glossary before continuing further.

CHAPTER 2

GUIDELINES FOR DEVELOPING MEASURES OF ERROR

This chapter presents guidelines for establishing a definition of overall payment error in the Pell Grant program and examines study design issues related to error measurement. This chapter focuses on six critical areas:

- Basic Construct for Error Measurement (What is a workable definition of Pell Grant payment error?)
- Issues in Establishing Operational Measures of Error (What are the critical design issues that must be considered?)
- Decomposition of Overall Payment Error (How can total error be divided into policy-relevant subparts?)
- Error Measurements over the Course of the Pell Cycle (What are the time-related research design issues?)
- Data Sources for Pell Error Measurement (What data are required for measurement, and what is their source?)
- Auxiliary Data Collection Requirements (What data are needed to measure experimental bias?)

BASIC CONSTRUCT FOR ERROR MEASUREMENT

Overall Payment Error

Overall payment error in the Pell Grant program is generally defined as the difference between the correct awards (the amount which should have been disbursed) and the awards which actually were disbursed to students over the course of a program year. The correct value is based on the true values for the application items, enrollment status, cost of attendance, and the other factors which determine a student's eligibility for a Pell Grant. Net overall payment error is the difference between all overawards to recipients and all underawards, while absolute overall

payment error is the sum of overpayments plus underpayments. As discussed below, any operational definition of overall payment error can only approximate "true" payment error in an entitlement program such as the Pell Grant program. It is not feasible to measure precisely the number or size of awards which could have been disbursed to eligible students but were not, due to error in ascertaining eligibility. Statistical estimates of error in the Pell Grant program are normally limited to estimates of error for the recipient rather than the population of eligible applicants. Further, the precision of estimates of overall payment error is a function of the extensiveness and intensiveness of the investigation of student eligibility and institutional, processor, or vendor procedures. More stringent examination of eligibility and/or procedures is likely to produce higher estimates of payment error. In principle, the more intensive the research into the circumstances affecting each award, the closer the measurement of error will be to "true" error.

Error Measurement and Quality Control

"True error" may not be the most appropriate reference point for a quality control system. Rather, the best measure of overall payment error for QC purposes should be geared to concepts of student eligibility and institutional procedures which are amenable to corrective actions and can be measured accurately and effectively. The precise definition of overall payment error in the Pell program should be formulated so that it provides accurate and reliable measures of program error which can be monitored in a quality control system. The definition of overall

payment error should include each of the components of program error that OSFA wants to monitor and to control or correct. Measures of the components of overall payment error, as well as measures of total payment error, provide necessary data for evaluating program performance from a quality control perspective. Systematic use of these data will allow OSFA to identify areas in need of corrective action, and, in conjunction with appropriate analysis procedures, help to establish probable causes of error. After corrective actions have been instituted, quality control measures will allow OSFA to measure the effectiveness of corrective actions as well as to identify any new problems arising in the Pell system.

ISSUES IN ESTABLISHING OPERATIONAL MEASURES OF ERROR

Specification of operational definitions of payment error to be used in a quality control system for the Pell Grant program involves several serious methodological issues. Each of these issues revolves around the difference between "measured" error and "true" program error. Although it may not be possible to obtain the most accurate, or closest approximation to "true" error, analysts and policymakers should understand each of these issues thoroughly in order to properly analyze survey findings.

Investigatory Versus Confirmatory Measures

Perhaps the most important methodological decision to be made in determining definitions of error in the Pell Grant program is the decision as to whether the verification of grant eligibility data is to be based on thorough, independent

investigation of student and/or institution procedures, or whether verification is designed to obtain data from students (or institutions) which substantiate data previously supplied by them. The first option, investigatory measurement, requires costly and time-consuming checks of student finances including collateral or credit checks, examination of tax files, cross checks of educational history, and so forth. This type of investigation would establish, with a high degree of certainty, students' "true" financial status, family circumstances, and educational status related to Pell eligibility. Confirmatory measures are designed only to verify that application data provided by students or institutions can be substantiated. Thus, if a student reports an adjusted gross income (AGI) of $10,000 in his or her application for a Pell Grant, a confirmatory error measurement procedure would involve verifying that this AGI was in fact reported on the appropriate student or family tax form. An investigatory procedure would determine whether this figure of $10,000 was the correct AGI figure. In short, confirmatory procedures are designed only to substantiate or validate data provided by applicants or institutions, while investigatory procedures are designed to independently establish the facts relating to grant eligibility. Investigatory measures of error are therefore fundamentally different from confirmatory measures.

The method of comparison between reported and verified data--investigatory or confirmatory--must be specified for each data item being evaluated in any study of error in the Pell

program prior to the planning of data collection efforts. Measures of error in the Pell program in 1978-79 and in 1980-81 studies were confirmatory measures.

Errors of Omission Versus Errors of Commission

The issue of whether data submitted by applicants for Pell Grants represent a true picture of their financial status involves the related questions of accuracy and completeness. Errors of omission by applicants are those where an applicant failed to report pertinent data. Errors of commission are those where data were reported incorrectly. These errors are closely related to the issue of investigatory versus confirmatory measurement discussed above.

Suppose, for example, that a student reports only part of net family assets. He or she correctly reports having $2,000 in a savings account but neglects to report $20,000 in a trust fund. This student has omitted pertinent data which might never be discovered in the course of a confirmatory measure of error. The student can confirm that the correct amount in his or her savings account is $2,000, but if the data collector does not know that the student has a trust fund, the issue of confirming the size of the trust fund may never arise.

In the course of conducting data collection for a quality control study, interviewers should be extremely careful in phrasing questions so that the risk of omission of pertinent data is minimized. Analysts should remain aware of the fact that the verification of data submitted by students is substantively

different from the establishment of the "true" data which would include data inadvertently or intentionally omitted by students.

Finally, errors of commission (instances where students have submitted incorrect data) will be caught only when verification data are available. In cases where confirmatory measures are being used, verification data can be supplied, directly or indirectly, only by the student and his or her parents. If the Pell applicant or his or her parents claim not to have filed an income tax return for the prior year, it is extremely difficult to verify what the correct AGI actually is. It is far easier to establish a measure of error among Pell recipients who freely provide documentation than among those who provide little or none. Analysts should be aware of this fact, and alternative approaches to estimating error among the recipient population for whom documentation has not become available need to be given careful thought.

Verifiable and Nonverifiable Data

The Pell Grant application includes several questions which require students to project future income and/or family circumstances. Perhaps the most significant of these items is the number of family members who will be attending postsecondary institutions in the fall. Students filling out applications can make a reasonable guess as to this figure, but often circumstances change. Analysts may therefore wish to consider the verification of this item in a special light and not automatically consider discrepancies between the application figure and the actual number in postsecondary education as errors.

Other types of estimates, such as student income data or nontaxable income data for the coming year, are essentially non-verifiable, in that assessing the accuracy of these estimates is somewhat arbitrary. The figures can be verified the following year, but it is extremely difficult, if not impossible, to establish the reasonableness of student-provided estimates. In any case, such "error" is not significant in terms of award eligibility or program error, since projected figures are not used in Student Aid Index (SAI) computations. In cases where applicants are estimating prior year income, however, error can be significant. This happens in cases where grant applications are submitted before tax forms have been filed. In cases where tax form data are estimated, discrepancies between application data and tax data submitted after the application has been filed may reflect circumstances the applicant did not anticipate, but which nevertheless should have been reported in corrections to the application. Analysts may therefore choose to differentiate error in projected data or estimated data from other errors, but there is a strong case to be made for including any discrepancies in estimated tax form data and subsequently filed tax form documentation as application error.

The most problematic type of estimated data is the data provided by students filing special condition (or "supplemental") forms. These students submit that substantial changes in family and/or financial circumstances have made their prior year's incomes inaccurate representations of their current statuses. Students therefore provide estimates of current year income in

their special condition applications. Such data cannot be verified by normal procedures. Further, verification of the accuracy of students' estimates does not have the same meaning as verification of reports of prior year income. Matches between estimates or projections and data on tax forms filled out subsequently probably should not require the same level of precision. Analysts should specify how special condition filers should be treated in error studies. If such recipients are not subject to verification it may be desirable to impute error for this subpopulation in total error estimates for all recipients.

Types and Strengths of Documentary Evidence

Verification of student application data may be obtained from a series of sources--interviews with parents and students, documentation obtained from student aid files at institutions, copies of tax forms submitted to the IRS, documentation of home value obtained from tax assessors, etc. In some cases more than one documented value for a given data element on the Pell application will be collected. The value of measured error on these items will then depend on which documented value is selected as the "verified" value. Analysts must therefore devise an algorithm to be integrated into the data analysis programs for selecting the best information to be used in verification of application data.

The first step in determining the priority of verification data is to create a matrix listing all the application items down the vertical axis and all the possible sources of verification

across the horizontal axis. Types of verification can be subdivided according to the strength or reliability of data collected in a single instrument or data source if this is appropriate. For instance, in interviews, parents can provide copies of notarized forms, signed forms, unsigned worksheets, or simple verbal assertions as documentation of adjusted gross income. These different levels of documentation may be listed as different categories across the horizontal axis. Once all the possible sources of verification have been specified, the relative strength of each can be ranked for each data item. The rules for ranking verification data should be logical and consistent but may vary for different types of data.

General rules might be:

1. Certified IRS tax form documentation overrides noncertified IRS data.

2 Tax form documentation obtained directly from the IRS overrides tax form data from any other source.

3. Notarized documentation overrides nonnotarized documentation (except for certified data obtained from the IRS).

4. Signed forms override nonsigned forms for documenting any data element.

5. Parent data override student data on all dependency status questions.

6. Parent data override student data on all family finance items for dependent students.

7. Student data override parent data in questions relating to student (or student and spouse) earnings and assets.

8. Unsigned parent or student data override unsigned data found in student records.

An example of a completed data source priority matrix (used in the Stage One study) is presented in Chapter 5.

DECOMPOSITION OF OVERALL PAYMENT ERROR

For the current Pell Grant applicant and award calculation system the correct calculation of a Pell Grant depends on up to 35 pieces of information or data elements, enumerated in Figure 2-1. The first 24 items are used to calculate the SAI, which is combined with the cost of attendance and enrollment status to calculate the expected award. The last nine items are categorical criteria which must be satisfied, or any payment made is considered to be totally in error. If the application form were simplified, as was recommended in the Stage One QC Study[1], then fewer pieces of information would be needed to make the correct calculation of a Pell award.

In order to identify corrective actions, it is desirable to decompose total payment error and allocate the resulting components to specific data elements and actors in the Pell Grant delivery system.

There are alternative levels of decomposition, as depicted in Figure 2-2. The first level decomposes overall error into two major components: student error and institutional error.

Overall error is defined as the difference between the amount actually disbursed to a student and what would have been

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[1]For recommendations to improve management procedures in the Pell Grant program see Quality in the Basic Grant Delivery System, Volume 2, Corrective Actions.

1. Adjusted Gross Income (AGI)
2. Taxes Paid
3. Medical Expenses
4. Father's/Applicant's Income
5. Mother's/Spouse's Income
6. Nontaxable Income
7. Family Size
8. Tuition
9. Home Value
10. Home Debt
11. Other Assets
12. Other Debts
13. Business or Farm Value
14. Business or Farm Debt
15. Number in Postsecondary Education
16. Student's Net Assets
17. Student's Net Income
18. Student's Expected Income
19. Support, Previous Year
20. Support, Current Year
21. Claimed as Tax Exemption, Previous Year
22. Claimed as Tax Exemption, Current Year
23. Lived with Parents, Previous Year
24. Lived with Parents, Current Year
25. Bachelor's Degree (BA)
26. Citizenship (CIT)
27. Statement of Educational Purpose (SEP)
28. Financial Aid Transcript (FAT)
29. Course Length
30. Eligible Program of Study
31. Grant or Loan Default
32. Half-time Enrollment
33. Satisfactory Academic Progress
34. Cost of Attendance
35. Enrollment Status

FIGURE 2-1

DATA ELEMENTS USED IN AWARD CALCULATION

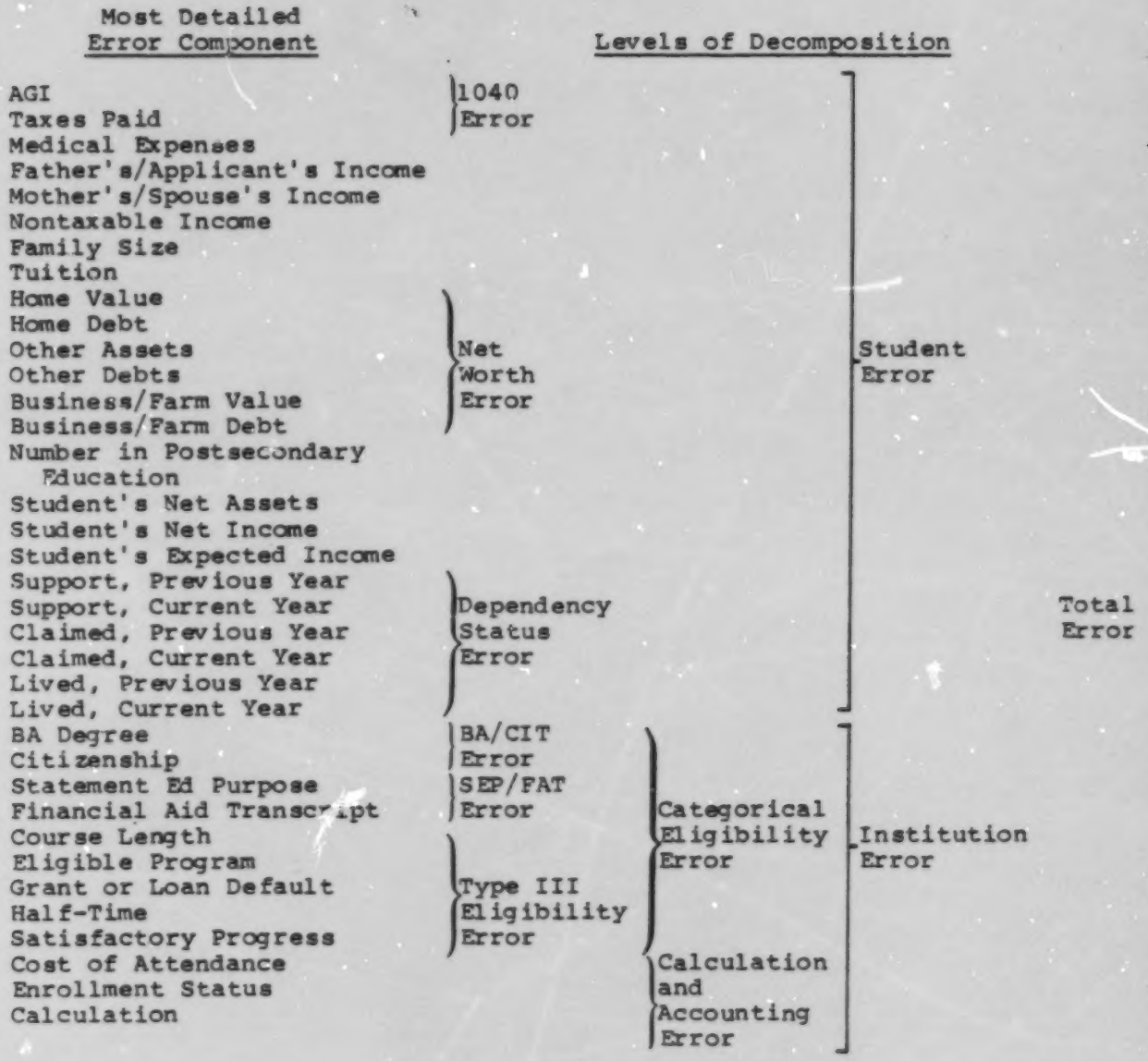

FIGURE 2-2

DECOMPOSITION OF TOTAL PAYMENT ERROR

disbursed if correct values were used for all 35 data elements.[2] Decomposition of this overall error depends on grouping the data elements by responsibility. The student is assumed to be responsible for the first 24 items (those used to calculate the SAI); the remaining 11 items are the responsibility of the institution.

Student award error may exist whenever 1 of the first 24 data elements is in error. This error is allocated to the student because these data elements are provided to the Pell delivery system by the student applicant.

Student error is the difference between two calculated payments. Both would be based on correct values for cost of attendance and enrollment status and the assumption that all categorical criteria are satisfied. However, one calculated payment uses the value of the SAI on record at the institution, while the other uses the value of the SAI based on the "best" data uncovered through the multifaceted field work effort. The rationale here is that this difference is attributable to student error and misreporting as it affects the SAI.[3]

Institution error exists whenever cost of attendance and enrollment status are in error or when one of the nine categorical criteria is not satisfied. These errors are allocated to the

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[2]Algebraic formulations of overall payment error and its components are presented as Appendix C.

[3]Not all student application error affects SAI computations; only error that affects SAI computations results in award error.

institutions because they are responsible for either providing these data elements or in certifying that the categorical criteria are satisfied.

Institution error is calculated as the difference between the amount disbursed by the institution and what would have been the calculated disbursement based on the correct values of cost of attendance, enrollment status, whether the categorical criteria were satisfied, and the SAI on record at the institution. Here any differences in SAI are held constant, and what differences exist are attributable to institutional mistakes in recording enrollment status and cost of attendance, or in certifying the satisfaction of the categorical criteria.

Student error can, at the extreme, be broken down into 24 more detailed components, one associated with each of the 24 application data elements. These marginal components represent how payment error would be changed if only that data element were not corrected while all other data items were replaced with the correct or best values. It is also possible to define these marginal components as the amount payment error would be changed if only that data element were corrected while all the other data items were not corrected.

While decomposition at the first level creates two components--student error and institutional error--which when added up equal overall error, this additive property does not hold for the 24 marginal components of student error. This deficiency is attributable to the interdependency of the various components involved in the SAI calculation.

As indicated in Figure 2-2, it is also possible to define error attributable to logical and policy-relevant groupings of application items, such as those which can be verified using an IRS form 1040, those determining dependency status, and those involved in the net worth component of economic resources.

There are three levels of decomposition of institutional error. First, institutional error is separated into two components: categorical eligibility error and calculation/accounting error. Categorical eligiblity errors occur whenever field work and record checks show that one or more of the nine categorical criteria has been satisfied. At the extreme, categorical error can be decomposed into nine separate components, one for each of the categorical criteria. As was true for student error, it is also possible to define error attributable to logical and/or policy-relevant groupings of these nine criteria.

The second component of institutional error, calculation and accounting error, occurs whenever there has been an error in correctly recording cost of attendance, enrollment status, and calculating and disbursing a correct award. As indicated in Figure 2-2, calculation and accounting error can be decomposed into three components: cost of attendance error, enrollment status error, and calculation error. These three components when added together are equal to calculation and accounting error. However, categorical eligibility error and calculation and accounting error when added together do not equal institutional error.

It is very important when analyzing the data to remember which components possess the additive properties and which do not. Confusion on this point could lead to incorrect policy inferences and inappropriate corrective actions.

An additional caveat concerning the error definitions discussed above is that they are based on the full annual Pell cycle. In other words, they are defined as if the entire cycle--from application through account reconciliation--was complete. Annual error assessment is unlikely to be carried out over such a prolonged period. Therefore, error measurement and definition must take into account the differences in timing between the measurement of error and the Pell grant cycle, which is discussed in the next section.

ERROR MEASUREMENTS OVER THE COURSE OF THE PELL CYCLE

Error measurement in a Federal grant program such as the Pell program involves three types of time-related research design factors. The first is the possible impact of the timing of data collection on the ability of students or parents to provide both accurate application and corrections data and documentation of these data. The second is the impact of institutional validation and account reconciliation procedures on grant accounts. Finally, Pell program procedures, from application processing edits through validation to account reconciliation, result in substantial adjustments to Pell final account figures. The first design factor, the timing of data collection on student error measures,

is discussed in greater detail in Chapter 4, but some basic methodological considerations are discussed below. Following this discussion, the importance of the combined impact of internal procedures and ED procedures on error measures over the course of the Pell cycle is briefly reviewed. Specific measurement points for assessing error over the course of the Pell cycle are then presented.

Time of Measurement and Student Error

Students normally apply for Pell Grants in winter or spring preceding the school year for which they seek aid. As discussed above, some students or parents have not yet completed their tax forms at the time of application. Others may experience significant changes in their financial circumstances related to their grant eligibility between the time they file their applications and when they receive their first disbursements. Students may also voluntarily correct data submitted in applications because they are incorrect either because of applicant error or processing error. Finally, students may be required to correct application data by institutions or by the Department of Education through the validation system. Depending on when information is collected, therefore, different views of student error might be recorded because either (1) data to verify application data are more readily available, which affects error measures (as just described) or (2) the data submitted by the applicant have actually been changed.

Measures of application error, i.e., comparisons of initial application data and verified data, should be used to measure application error. These measures are necessary for monitoring quality of application forms and forms processing. Measures of student error taken after the corrections process is completed should be used to assess the amount of error not removed by existing program procedures.

Institutional and Program Procedures over the Course of the Pell Cycle

Pell disbursements are made at least twice during the course of an academic year and frequently more often. Institutions must follow program procedures for authorizing and disbursing grants, as well as their own internal program accounting and audit procedures. Reconciliation of Pell accounts may take place at various points throughout the year. Final reconciliation data are normally submitted to the Department of Education following the final disbursements in spring or summer. The Program Information and Monitoring System (PIMS) runs institutional data on student accounts through a series of edits designed to identify errors in institutonal accounts reconciliation so that such errors can be corrected. Because there is an ongoing process of disbursements, accounts reconciliation, and review over the course of the year, measurement of institutional error is particularly sensitive to the time factor in research design. On the one hand, it is extremely difficult to identify procedural errors after the fact, i.e., after accounts have been reconciled.

This is particularly true for errors related to Pell Grant eligibility. Institutions are required to check students' enrollment status prior to disbursing grants. It is very difficult to go back at the end of the year and determine what a student's status at the time of disbursement was if the student drops or adds credits later in the academic term. It may also be difficult to determine if statements of academic purpose or financial aid transcripts have been collected if data collection is conducted late in the cycle, since these records may no longer be easily accessible, particularly in highly automated systems. On the other hand, what may look like an over- or underpayment at one time may be straightened out by the end of the year. Therefore, as in the case of student error, different measures of institutional error may be required for estimating overall payment error.

Data Collection Points in the Pell Cycle

Measurement of overall payment error in the Pell program can be taken at five basic points in the program cycle:

- The point at which the SAI is first calculated by the application processing contractor using application data and any necessary corrections. This value of the index is denoted as SAI(0).

- The point at which the Student Aid Reports (SARs) is collected from the institution during the sampling stage of the study. The aid index recorded at this time is denoted as SAI(1). Cost of attendance and enrollment status collected at that time are denoted as COST(1) and ENROLL(1), respectively.

- The point when data collectors complete parent and student interviews, collect releases for copies of tax returns, or perform whatever data collection is

appropriate for verification of eligibility data. These data are used to calculate a verified student aid index SAI(2).

- The point when data collectors abstract information from student records at the institutions. The aid index, cost of attendance, and enrollment status collected at this time are referred to as SAI(3), COST(3), and ENROLL(3). Data should also be collected on actual and planned disbursements, AD(3).

- The point at which institutions submit their final reconciliation rosters to the Department of Education. Values for the aid index, cost of attendance, enrollment status, and actual disbursements collected at this time are denoted as SAI(4), COST(4), ENROLL(4), and AD(4), respectively.

The specifications for developing measures of overall payment error from these data are described below.

DATA SOURCES FOR PELL ERROR MEASUREMENT

As discussed in the previous two sections, error measurement and definition depend on the timing of data collection and the intensiveness of data collection. Intensiveness of data collection affects which components of overall payment error can be assessed. In this section the data requirements for alternative error definitions are described.

Decisions concerning error definitions for annual assessment of overall error would include:

- Whether measurement should be before or after reconciliation, or both

- Whether total error should be broken down into student and institutional components

- Whether student error should be further broken down into item or marginal impacts and item error rates

- Whether application item error rates should be measured

- Which items should be verified
- Whether institutional error removed through reconciliation should be assessed

Five sources of data can be defined:

- Computed applicant record from the central processor
- Verification of application information directly from the students and parents during interviews or indirectly from agencies such as the IRS
- Institutional copies of SAR used for disbursement
- Institutional record abstracts used to verify institutional data
- Reconciliation roster data submitted to ED

Figure 2-3 indicates the relationships between data elements and data sources. For example, information on an individual recipient's cost of attendance is collected either at institutions or from PIMS's reconciliation roster.

Figure 2-4, Matrix of Outcome Measures and Data Sources, identifies the data collection sources required for the alternative error measures. Entries in the table indicate the nature of the data required for the measure. For example, estimation of pre-reconciliation, total award error requires student interviews, institutional record abstracting of data on disbursements, cost of attendance, enrollment status, and categorical items.

As indicated in the table, most measures require data from students and parents and institutional visits. However, if a restricted error definition, such as tax form error, was used, the student/parent data collection could be restricted to securing tax form releases. Various data collection options are discussed in more detail in Chapter 3.

DATA SOURCES

DATA ELEMENTS	CENTRAL PROCESSOR: Computed Applicant Record	STUDENTS/PARENTS: Student/Parent Interview and Verification of Application	INSTITUTIONS: Institutional Disbursement SAR	INSTITUTIONS: Institutional Record Abstract Verification	PIMS: Reconciliation Roster
Income	X	X			
Expenses	X	X			
Wealth	X	X			
Status	X	X			
Family Size Structure	X	X			
Student Aid Index (SAI)	X	X	X		X
Cost of Attendance			X	X	X
Enrollment Status			X	X	X
Categorical Rules (9 items)				X	X

FIGURE 2-3

DATA ELEMENTS BY DATA SOURCES

OUTCOME MEASURES	DATA SOURCES					
	CENTRAL PROCESSOR		STUDENTS/ PARENTS	INSTITUTIONS		PIMS
	Computed Applicant Record		Verified Data	Disbursement SAR	Verified	Reconciliation Ros
	First	Last				
Total Award Error						
Pre-reconciliation			X	X (Disb)	X Cost Enrollment Categorical	
Post-reconciliation			X		X Cost Enrollment Categorical	X (Disb)
Student Error						
Total Pre-reconciliation			X	X (SAI)	X Cost Enrollment Categorical	
Total Post-reconciliation			X			X (SAI)
Item Impact		X	X	X Cost		
Application Error	X		X	Enrollment		
Final Item Error		X	X			
Institution Error						
Total Pre-reconciliation				X (SAI)	X Disbursement Cost Enrollment	
Total Post-reconciliation					X Disbursement Cost Enrollment	X (Disb
Categorical Error						
Pre-reconciliation					X Disbursement Categorical	
Post-reconciliation					X Categorical	X (Disb)
Disbursement Error						
Pre-reconciliation				X (SAI) Cost Enrollment	X Disbursement Cost Enrollment Categorical	
Post-reconciliation					X Disbursement Cost Enrollment Categorical	X Disbursement Cost Enrollment

FIGURE 2-4

MATRIX OF OUTCOME MEASURES AND DATA SOURCES

AUXILIARY DATA COLLECTION REQUIREMENTS

Two challenges to the validity of sample surveys are:

- Experimental Bias
- Nonresponse Bias

There are two aspects of experimental bias which might affect survey results given a two-stage (school-student) sample selection. First, schools selected in the first stage may alter their behavior such that their error rates are improved when compared to schools not selected. Second, selected students may likewise behave differently from nonselected students.

Behavioral differences, or experimental bias, were measured in the Stage One study as differences in corrections behavior. If students were reacting to selection, one would expect fewer corrections which increased eligibility and/or more corrections which decreased eligibility. Similarly, one would expect selected institutions to encourage this type of student behavior. While it is not possible to measure the extent of experimental bias, one can assess its existence by contrasting the corrections behavior of selected students at selected institutions with all students at selected institutions and by contracting corrections behavior of students at selected schools with students at non-selected schools.

These contrasts require drawing two additional samples:

- Students at nonselected institutions
- Nonsampled students at selected institutions

Additional data collected for these two samples (and for the sampled students at selected institutions) would involve the

central processor's computed applicant file. This data base would be used to develop profiles of corrections behavior for the three groups. The profiles would encompass the number of corrections and eligibility consequences of these corrections.

The second validity challenge, nonresponse bias, can be addressed in the same way it was for the Stage One study. Unlike most surveys, the Pell QC study allows the gathering of considerable information for nonrespondents. This would include income, wealth and family demographic data from the application, payment or award amounts, corrections behavior, and institutional data.

Profiles of respondents and nonrespondents along these dimensions can be compared in order to assess the degree to which respondents differ from nonrespondents.

If the differences are significant, and the response rates differ across groups, the profiles can be used to make detailed adjustments for nonresponse bias. In addition to these corrections, sensitivity analysis can be performed to assess the impacts of the various assumptions which might be made concerning error levels for nonrespondents.

CHAPTER 3

DATA COLLECTION AND SAMPLING ALTERNATIVES

Once decisions have been reached about a definition of payment error, the components of that error to be measured, and the types of data required for such measurement, the following issues must be considered:

- Data collection alternatives (What is the best way to obtain the desired error measures?)
- Sample selection alternatives (What is the best method for selecting a nationally representative sample of recipients?)
- Sample size implications (What are the required sample sizes, given various levels of confidence and precision?)

DATA COLLECTION ALTERNATIVES

At a minimum, the following information must be collected on each sampled recipient in order to measure total Pell Grant error:

1. Actual Pell Grant disbursement
2. SAI used to calculate disbursement
3. Cost of Attendance
4. Enrollment Status
5. Documentation that verifies student's categorical eligibility for the Pell Grant
6. Documentation that verifies application data

Required data items one through five--disbursement, SAI, cost, enrollment, and eligibility--must be collected from student

records at institutions[1] and required item six--documentation that verifies application data--must be collected directly from the student and parent and/or from agencies and organizations such as the IRS, tax assessors, and so on.

Four discrete approaches for collecting the required information can be identified. The four data collection options are distinguished by the method by which data are collected: in-person data collection, telephone interviewing, and mail survey.

These options are presented in Figure 3-1. In Option 1, student record data (required items one through four) would be collected by site visits to institutions, and student/parent data (required item six) would be collected by in-person interviews and by mail from the IRS and possibly from other agencies and organizations. Option 2 would have the same features as Option 1 except that in-person interviews with students and parents would be replaced by telephone interviews. Option 3 would be a scaled-down version of Options 1 and 2: no student and parent interviews would be conducted. Option 4 would have no field work; all institutional and student/parent data would be collected by mail.

In Figure 3-2 the four options are compared according to their ability to meet the following objectives for an ongoing Pell Grant error assessment system:

- Minimize Financial Cost
- Maximize Reliability of Error Measures

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[1]This assumes a pre-reconciliation measure of error (see Figure 2-4). For a post-reconciliation measure the disbursement SAI would be taken from the PIMS reconciliation roster.

	OPTION 1	OPTION 2	OPTION 3	OPTION 4
Institutional Data Collection	Visits to institutions	Visits to institutions	Visits to institutions	Collection of institution data (actual disbursement, enrollment status, SAI, cost) by mail from institution
Student/Parent Primary Data Collection	In-person interviews with students and parents	Telephone interviews with students and parents	None	None
Student/Parent Secondary Data Collection	Collection of release forms from students or parents and collection of verifying documentation by mail from agency/organization	Collection of release forms from students or parents and collection of verifying documentation by mail from agency/organization	Collection of release forms from students or parents and collection of verifying documentation by mail from agency/organization	Collection of release forms from students or parents and collection of verifying documentation by mail from agency/organization

FIGURE 3-1

DATA COLLECTION OPTIONS

	OPTION 1	OPTION 2	OPTION 3	OPTION 4
Objectives:				
Minimize Federal Cost	Most costly option. High costs associated with travel and time spent conducting in-person student/parent interviews. In contrast to telephone interviews, in-person interviews generally require more knowledgeable and reliable interviewers.	Less costly than Option 1. Costs associated with telephone interviewing (person hours and telephone bills) are less than costs associated with in-person interviewing (person-hours, transportation, lodging).	Less costly than Option 1 and Option 2. With no student/parent interviews, major costs arise from time and travel for institutional visits.	Least costly option. No travel costs. Generally, mail surveys can rely on lower salaried clerical staff, whereas, field data collection requires more knowledgeable and experienced personnel.
Maximize Reliability of Error Measures	High reliability since verifying documentation on all 24 application items used to calculate SAI collected during in-person interviews, institutional visits, and from secondary sources	Lower reliability than Option 1 since, without in-person interviews, considerably less documentation collected. Would have to rely on a limited student error definition, e.g., student error based on tax return error	(Same as Option 2)	Low Reliability. Would have to rely on limited student error definition. Data received by mail from institutions would be unverified.
Maximize Precision of Error Estimates	Sample size is a determinant of accuracy (see Figure 3-3A-3-3D). To reduce travel costs, recipient sample would have	Essentially same as Option 1. However, with no in-person student/parent interviews, the need to cluster institutions	(Same as Option 2)	With no travelling, no clustering needed. This would eliminate the undesirable design effects of cluster sampling.

FIGURE 3-2

SUMMARY COMPARISON OF DATA COLLECTION OPTIONS

	OPTION 1	OPTION 2	OPTION 3	OPTION 4
Maximize Precision of Error Estimates (Continued)	to be clustered. Clustering tends to reduce accuracy of estimates.	geographically to reduce travel costs not as great. Note: Given a set budget, a larger sample could be drawn under this option than under Option 1 since phone interviewing is less costly than in-person interviewing.		Note: Given a set budget, a much larger sample could be drawn under this option than under any other option since data collection costs are lowest.
Maximize Response Rate	Relatively high response rate with in-person student/parent interviewing	Response would tend to be lower than in Option 1. Some students would not have telephones.	Response would tend to be lower than in Options 1 and 2, unless the mail survey were followed up aggressively by telephone calls.	(Same as Option 3)
Ensure Collection of Ancillary QC Data[1]	Could be collected through interviews and file reviews at institutions and interviews with students/parents	(Same as Option 1)	Could be collected from institutions, but not from students/parents	Unless this option included a mail survey of institutions and parents, it could not be collected.

[1]Ancillary QC data include data not needed to measure error. For example, data collected to ascertain the reasons for payment error are considered ancillary QC data.

FIGURE 3-2 (Cont'd)

SUMMARY COMPARISON OF DATA COLLECTION OPTIONS

	OPTION 1	OPTION 2	OPTION 3	OPTION 4
Minimize Burden on Respondents	Time burden on institutional personnel: 1-6 hours. Time burden on students/-parents: 2-4 hours.	(Same as Option 1)	Institution burden same as Option 1 student/parent burden much less than in Options 1 and 2	Institution burden potentially greater than in Options 1-3. Student/parent burden same as Option 3.
Minimize Time-Frame for Data Collection	Depending on sample size, sampling method, staff size, and other factors, 4-8 months required to select sample and complete collection of data	Shorter period of time than Option 1: 3-5 months depending on sample size, sampling method, staff size, etc. Unanticipated problems such as inclement weather do not disrupt phone interviewing schedule as they might in-person interviewing schedule.	(Same as Option 2)	Shorter period of time than Options 1-3: an estimated 2-5 months depending on staff size, sample size and other factors
Maximize Feasibility of Developing ED In-House Capability	With training and specifications, institutional visits could be conducted by DCPR program reviewers. Considerable costs would be associated with developing nationwide student/parent interviewing capability. Minor costs would be associated with developing mail survey capability	Essentially same as Option 1, however, development costs for phone interviewing would be less than for developing in-person interviewing capability	With no student/parent interviews, development costs would be relatively minor	(Same as Option 3)

FIGURE 3-2 (Cont'd)

SUMMARY COMPARISON OF DATA COLLECTION OPTIONS

- Maximize Precision of Error Estimates
- Maximize Response Rate
- Ensure Collection of Ancillary QC Data
- Minimize Burden on Respondents
- Minimize Timeframe for Data Collection
- Maximize Feasibility of Developing ED In-House Capability

Option 1

This option would be essentially the same as the approach used in the Stage One study and would include visits to institutions, in-person student/parent interviewing, and data collection by mail. It would be the most costly of the four options since there are major costs associated with nationwide in-person interviewing. These costs include travel, lodging, salaries, and per diem for field workers as well as salaries for support staff. This option also would require the longest period of time to implement. Even with a small sample, a minimum of four months would be required to select the sample and complete the data collection.

ED's Division of Certification and Program Review (DCPR) program review staff, with training and specifications, could conduct the institutional site visit component of this option. However, it is very unlikely that ED, in the short-term, could develop an in-house capability to conduct in-person student and parent interviews. Interviewing a nationwide sample of parents and students requires a nationwide network of interviewers such as Westat used in the Stage One study.

In spite of these drawbacks, this option, of the four, would provide the most reliable error measures and the most useful information for corrective action decision making. As discussed in Chapter 2, the reliability of the error measures depends in large part on the extensiveness and intensiveness of the data collection. For example, to measure student error properly, verifying documentation of all 24 application items used to calculate the SAI must be collected for each recipient in the sample. Interviewing students and parents in person, unlike interviewing by telephone or not interviewing at all, would ensure collection of a substantial amount of valid verifying documentation of application items. Of the four options, this option is the most extensive and intensive and thus would give the most accurate reading of program error.

Option 2

In this option, students and parents would be interviewed over the telephone rather than in person. There are several operational advantages to interviewing by telephone. First are cost considerations. Some telephone interviews are similar in cost to personal interviews if the survey requires long distance dialing between nine to five and involves a lengthy interview and/or requires talking with a number of people before the target respondent can be identified. However, these situations would probably not apply to a Pell Grant error study and therefore it is likely that, in this case, the telephone interview would cost less than the in-person interview. Second, telephone interviewing can be conducted in a much shorter period of time than

in-person interviewing. Finally, unanticipated problems such as staff attrition are controllable if the survey is a telephone survey instead of a personal interview since problems can be immediately identified and solutions can be quickly implemented.

There are disadvantages to interviewing by telephone. First, many respondents would not have telephones or could not be reached easily by telephone. Second, and more important, telephone interviewing would require that the study rely heavily on obtaining documents from a secondary data source (i.e, IRS, tax assessments, bank, public assistance offices, etc.) since in-person visits to view verifying documentation would not be conducted. Therefore, error measures under this option would be less reliable than under Option 1 since they would more than likely be based on an incomplete set of data.

Option 3

In this option, students and parents would not be interviewed. This option has the same strengths and drawbacks as Option 1, the major strength being its relatively low cost and the major drawback being that all verifying documentation of student application information would come from secondary sources. This option has one additional drawback. With no student and parent interviews, data that could be valuable to corrective action decision making would not be gathered. For example, in the Stage One study, valuable insights into the sources of student payment error were obtained during the student and parent interviews.

Option 4

In Options 1, 2, and 3 institution data would be collected through site visits. In Option 4, however, the required institution data would be collected by mail by providing each sampled institution a set of detailed specifications for abstracting information from the sampled recipients' files. This option has several operational advantages over the others. First, with no field work, it could be conducted at a relatively low cost. Second, the recipient sample would not need to be clustered, thus eliminating the undesirable design effects of cluster sampling. Third, ED in the short term, with relatively little investment in new staff, could develop an in-house capability. There are two serious drawbacks in collecting institutional data by mail. First, the burden on institutions could be significantly greater than in the other options. Second, and more important, data received from institutions on sampled recipients would be unverified. This would detract significantly from the reliability of the error estimates.

Recommendation

This assessment of the four options indicates that Option 1 is the desirable data collection approach for an annual assessment of Pell Grant error. It has by far the most potential of the four for providing accurate and reliable error measures. In Chapter 4, technical specifications for this approach are set forth in detail.

SAMPLE SELECTION ALTERNATIVES

Although the principle determinant of the accuracy of inferences based on a sample is the number of cases included in the sample, the way in which a sample is selected also affects accuracy. Clustered samples will usually be less accurate than unclustered ones because the clustering process itself is a potential source of error.

Therefore, the most accurate estimates would be based on a sample of all Pell Grant recipients, in which each recipient's chance of being included would be equal, not dependent on association with a cluster, such as attendance at a particular institution. Such a sample could be drawn at any time from the PIMS recipient file. A simple random sample of those whose SAR data have been entered as of a certain date could be of any size.

This sampling method has two disadvantages, however. Since it is not clustered, practically every medium or large institution, and many small institutions, would be represented, most of them by only one student. Institutional data collection would involve visits to so many institutions as to be completely unfeasible. The students themselves would also be extremely disbursed geographically, which would make interviewing them also unfeasible. Therefore, an unclustered sample would only be used in conjunction with a data collection procedure that involves visiting neither institutions nor students--in other words, Option 4.

If the student/parent sample is to be clustered at institutions, a two-stage sample must be drawn. First, a sample of institutions must be drawn from the universe of eligible

institutions; then a sample must be drawn of the recipients attending those institutions. One way to do this is to secure a list of each institution's recipients and sample from each list at the study's main office. That is the procedure specified in Chapter 4. The advantages of the procedure are that the sampling process is entirely under the control of the QC project staff, and the sample can be drawn before the institution site visits are made. However, there is a burden on the institutions, which must list all their Pell recipients by name with their grant amounts, addresses, telephone numbers, and Social Security numbers; and a considerable administrative burden on the project office, which must compile all the lists, pester laggard institutions, and draw all the samples.

An alternative method of drawing a clustered sample is to leave it up to the site visitors. They would be trained in the sampling method to be used and told how many recipients to sample from each institution. Upon arriving at the institution, the site visitor would draw the sample from a list of the recipients prepared by the school.

This method was used during the fall, 1982 validation evaluation to draw a sample to be used then and for the spring, 1983 data collection for Phase Three of the Quality Control Project. The overall sample was allocated among institutions based on measures of size from the previous year (as would probably have been done no matter how the sample was drawn). A systematic selection interval was calculated for each institution which

produced the desired number of respondents, and then a random start number was assigned. From the interval and start number, a sampling worksheet was composed which listed the sequence numbers of all the recipients to be sampled from each institution, assuming that the recipients could be numbered consecutively starting with "1" at each school in the sample.

Problems arose with this method when the field staff tried to get lists of recipients at the institutions. Because the sampling method had been worked out too late for the list to be requested in the initial letter to the institutions, each institution was asked during the scheduling telephone call to compile a current list of paid Pell recipients and have it ready for the data collector on arrival. However, the instructions to the telephone staff were not extensive enough to cover some unusual situations; sometimes explicit instructions about what the list should contain could not be given over the telephone. Moreover, many institutions either could not compile a list which would meet the project requirements, or were unwilling to take the time which would have been required.

Therefore, the site visitors were confronted with a great variety of lists and, at many institutions, no list at all. Frequently, the list which was available included people who were not part of our study, such as recipients of aid other than Pell Grants, or of aid applicants who had presented valid SARs but had, finally, not enrolled in the institutions. The data collectors had to examine such lists and delete the irrelevant entries.

At some institutions, this could be done only by consulting other records or lists which were not in the same order. In those cases, it was necessary to take a preliminary sample with the knowledge that it included people who were not subjects of the study and would, therefore, be longer than desired. Only the records of these persons would be checked to delete the ineligibles and arrive at a valid sample. If data institutions had not compiled lists, collecters were to do this manually in order to document fully the sampling procedure.

Each of these different procedures was often very time consuming. Compiling lists where none existed was quickly found to be impracticable at all but the smallest institutions. Data collectors counted through stacks of SARs, drawers of file folders, or boxes of file cards to draw samples. From a planning perspective, the most severe problem arose when data collectors had to compile or edit lists. It was impossible to tell in advance if this was the situation at a given institution. At some institutions, compiling the list and drawing the sample took all the time scheduled for the entire data collection. Data collectors were forced to stay an extra day at some of these institutions, in which case other parts of their schedules were rearranged or a special "floater" was sent in to complete the scheduled visits.

Another problem encountered in drawing the sample in the field was caused by multi-campus institutions with decentralized record systems (each campus keeping all the records for its

recipients) that filed a single Progress Report. Since Progress Reports were used to draw the sample of institutions, it was not possible to draw a single campus in advance. When scheduling these visits it was also difficult to determine whether the required information was kept at the main campus or the branch campus. Thus, in some instances data collectors arrived at a campus only to find that the records of some students were elsewhere, even in another state. Subsampling procedures, which involved getting a count of the number of recipients or students at each campus and consulting with the project office by telephone, had to be developed after the data collectors had gone into the field. In one case this resulted in the selection of a campus in another state. The financial aid administrator had to fly to the site and the "floater" data collector and a member of the central project staff had to be sent in to collect the data. In other cases, problems arose when the branch campus selected was not expecting a visit because the notification letter had been sent to the main campus.

Timing is another problem with this method. The site visits must be completed before initiating, student/parent data collection. However, the institution visits cannot be made until late in the spring (April and May), after final payments have been posted to student records (otherwise, one would not know how much money a student actually received). Obtaining the student sample in April or May would require interviewing the students in the summer. That would be a year or more after many of them had

filled out their Pell applications. Moreover, many of the addresses on the institution's records and on the SAR would no longer be valid, requiring a major tracing effort and a large increase in the number of unlocatable students. (Even if the parent address did not change, some students would be spending at least part of the summer elsewhere, and most graduating seniors would have found jobs and established their own households.)

The only readily apparent solution to this problem, other than securing sample lists by mail as recommended, is to send specially trained samplers to the institutions in the fall. In effect, this is what was done in the fall of 1982, however, the sampling was combined with a special data collection done to evaluate validation procedures. To send people out only to collect the sample would be too expensive when compared to the recommended method.

SAMPLE SIZE IMPLICATIONS

The number of students who must be sampled depends on four factors: the degree of precision wanted for the statistical inferences derived from the data; the amount of confidence desired in these estimates (the significance level); the degree of clustering to be used; and the degree of homogeneity within each cluster. Figures 3-3A through 3-3D at the end of this chapter show the number of recipients needed to achieve some common precision and confidence levels assuming specified cluster sizes

and degrees of intracluster homogeneity. The table entries are calculated from the formula

$$n = \left(\frac{v_e^2 + (1-p)}{p}\right) \left(1+\rho\,(n_c-1)\right) \left(\frac{t\alpha}{\text{half width}}\right)$$

where:

- n = the number of cases required
- p = proportion of cases with error
- v_e^2 = the relative variance of the means of the cases with error
- ρ = the intracluster correlation
- n_c = the number of cases in each cluster, i.e., the number of students at each sampled institution
- t = the standard normal deviate associated with a particular confidence interval

The first two tables are based on the assumption that intraclass correlation is quite low ($\rho = .1$), that is, that the students at each institution differ considerably among themselves. In the last two tables, a higher intraclass correlation ($\rho = .5$) is assumed, that is, there is significantly less variation among the students at each institution. In Figures 3-3A and 3-3C it is assumed that an average of only 5 students are selected from each sample institution; in Figures 3-3B and 3-3D it is assumed that 15 students are selected from each sample institution.

Within each table, four precision levels and four confidence levels are given. The precision level is how close the estimate made from the sample must be to the true value, which one could determine only by collecting data from every recipient or his

parents. These precision levels are expressed as proportions of the sample mean. For instance, if one had an average error of $100, a precision level of .10 would indicate that the actual mean is $100 ± .10 ($100), or between $90 and $110; a precision level of .025, on the other hand, would indicate that the mean is $100 ± .025 ($100), or between $97.50 and $102.50. The precision level is also called a "half width" because it is half as wide as the range within which the population value probably falls (because it is both added and subtracted to the sample value). The confidence level indicates how sure one can be that the population value actually falls within this range, expressed as a probability. Thus, a confidence level of .975 indicates that there is a 97.5 percent chance that the population value is equal to the sample value plus or minus the precision level; if 200 different estimates were made at this confidence level, only 5 of them would differ from the true population value by more than the precision level. At the lowest confidence level given, .90, 1 in 10 of the estimates would be off by more than the precision level.

Within each table it is obvious that the greater the precision desired (expressed by <u>smaller</u> half-widths), the larger the sample must be; likewise; the higher the confidence level desired, the larger the sample must be. These two requirements are cumulative, so that if <u>both</u> greater precision and higher confidence are desired, the sample must be very large indeed (note the lowest left-hand box in each table).

Cluster size and intracluster correlation also affect the required sample size. Larger cluster sizes make both the institutional and the student/parent data collection more efficient if visits are involved, but there is a loss in accuracy, expressed in Figures 3-3B and 3-3D by larger required sample sizes for the same precision and confidence levels. Higher levels of homogeneity among the students in each institution (expressed by higher values of ρ) require larger samples for the same accuracy. As with precision and confidence levels, the effects of cluster size and intracluster homogeneity are cumulative, so that both a large cluster size and a high level of homogeneity within clusters requires the largest samples. Since these effects are also cumulative with precision and confidence effects, the largest sample in the Figures is that required for high precision (half-width = $\pm$ .025), a high confidence level (confidence level = .975), a large cluster size (n_c = 15), and a high intraclass correlation (ρ = .5); this is the entry in the bottom left cell of Figure 3-3D, a sample of 64,225.

For the purpose of calculating sampling error, a subsample can be treated as an independent sample from a smaller population. The principal determinant of the accuracy of any sample or subsample is the sheer size of the sample; the proportion the sample bears to the population is largely irrelevant unless the proportion is very large (generally on the order of 20 percent or more), much larger than would be practicable for the Quality Control Project. Since any subsample must be smaller than the

sample of which it is a part, estimates based on subsamples will be less accurate than estimates based on the entire sample except in highly unusual situations not likely to be obtained for the Quality Control Project. In other words, conclusions about subgroups of Pell Grant recipients not filing 1040s or 1040As, must be less certain than conclusions about all Pell recipients.

For example, if the cluster size were limited to 5, and the intraclass correlation was low (P = .1)--as shown in Figure 3-3A--a sample of 2,397 would be large enough for 95 percent confidence and a precision level of plus or minus 5 percent. Suppose, however, that 25 percent of all recipients did not file an IRS return. A sample of 2,397 would include about 599 such people. But Figure 3-3A shows that with only 599 cases, one could be only 95 percent confident in a precision level of plus or minus 10 percent of the sample value. In other words, estimates for non-filers alone would only be about half as accurate as estimates for all students (including non-filers).

This phenomenon also applies to groups which are smaller than the full sample because of inapplicable or missing data, or to conclusions about causes of error which are based only on recipients with that error rather than on all recipients. For instance, only 23 percent of all recipients in the 1980-81 study sample had hard documentation of home debt. Error estimates for this group alone would be only about half as accurate as estimates for all recipients. For some application items, the proportion with documentation was only about one percent. Error

estimates for these groups, if based only on recipients with documentation, would be only about one-tenth as accurate as estimates based on the full sample.

In summary, follow these three steps to calculate the accuracy of making estimates about a subgroup or subsample.

1. Estimate the size of the subsample. (For example, if one knows that the subsample is 50 percent of the full sample and the size of the full sample is 1,000 the estimated size of the subsample is 500.)

2. Determine the cluster size and interclass correlation.

3. Locate the subsample size on the appropriate table (Figures 3-3A and 3-3D) and find the confidence and precision levels.

Half-Width or Precision	Confidence Level			
	.975	.950	.925	.900
± .10	783	599	494	425
± .075	1,392	1,065	879	755
± .050	3,131	2,397	1,977	1,699
± .025	12,524	9,589	7,908	6,795

FIGURE 3-3A

PRELIMINARY ESTIMATES OF
REQUIRED RECIPIENT SAMPLE
SIZES ASSUMING THAT
$\rho = .1$
$n_c = 5$

Half-Width or Precision	Confidence Level			
	.975	.950	.925	.900
± .10	1,340	1,026	846	727
± .075	2,382	1,823	1,504	1,292
± .050	5,359	4,103	3,384	2,908
± .025	21,435	16,411	13,535	11,631

FIGURE 3-3B

PRELIMINARY ESTIMATES OF REQUIRED RECIPIENT SAMPLE SIZES ASSUMING THAT

$\rho = .1$

$n_c = 15$

Half-Width or Precision	Confidence Level			
	.975	.950	.925	.900
± .10	1,676	1,283	1,058	909
± .075	2,979	2,281	1,881	1,617
± .050	6,704	5,132	4,233	3,637
± .025	26,814	20,530	16,932	14,549

FIGURE 3-3C

PRELIMINARY ESTIMATES OF
REQUIRED RECIPIENT SAMPLE
SIZES ASSUMING THAT
$\rho = .5$
$n_c = 5$

Half-Width or Precision	Confidence Level			
	.975	.950	.925	.900
± .10	4,014	3,073	2,535	2,178
± .075	7,136	5,464	4,506	3,872
± .050	16,056	12,293	10,139	8,712
± .025	64,225	49,172	40,556	34,848

FIGURE 3-3D

PRELIMINARY ESTIMATES OF
REQUIRED RECIPIENT SAMPLE
SIZES ASSUMING THAT
$\rho = .5$
$n_c = 15$

CHAPTER 4

DATA COLLECTION SPECIFICATIONS

OVERVIEW

In Chapter 3 it was recommended that ED collect data for an ongoing annual assessment of error using a three-faceted approach: visits to institutions to collect information from student aid files, field interviews of Pell Grant recipients and their parents, and collection of verifying documentation by mail from organizations such as the IRS, banks, public assistance offices, and tax assessors. In addition, it was recommended that the Pell Grant recipient sample be selected by project office staff in advance of the field work from up-to-date recipient lists requested from sampled institutions rather than by field representatives during the institutional visits.

Specifications for collecting data using this approach are set forth in detail in this chapter. In this particular section, several important assumptions made in developing these specifications are listed. Also in this section is a discussion of several issues that must be considered when scheduling the data collection. In the remainder of the chapter, technical specifications for collecting data are presented task by task and step by step. Four general tasks are identified: sample selection (TASK 1), student and parent interviews (TASK 2), collection of secondary data, i.e., verifying documentation from the IRS and other organizations (TASK 3), and visits to institutions (TASK 4). Each task has been divided into subtasks. The descriptions

of each subtask follow a set format: first, a discussion of the purpose of the subtask and any important issues that need consideration and, second, a step-by-step list of procedures.

Figure 4-1 presents an overview of the tasks and subtasks described in this chapter in a way that illustrates their interdependencies. No time line has been illustrated in this chart, nor should one be implied; its express purpose is to describe the path by which data collection must proceed.

Major Assumptions Made in Developing Data Collection Specifications

The technical specifications as set forth in this chapter make no presupposition with regard to sample size, the organization(s) responsible for collecting the data, or the time of year and duration of the data collection. In other words, the procedures specified hold true regardless if the recipient sample is 500 or 5,000, if the field work is conducted by regional program reviewers from the DCPR or by a contractor, or if the data are collected in one month or six months.

However, it was necessary to make several important assumptions about ED's goals for an ongoing assesment and about Pell Grant program changes when developing the data collection specifications. The following were assumed:

- ED will wish to measure total payment error as well as its subcomponents, institution error and student error and their subcomponents, categorical error, calculation/accounting error, and application item error (see Figure 2-2, "Decomposition of Total Payment Error").
- ED will wish to collect data not directly needed to measure payment error. For example, ED will wish to collect data on institutional procedures as part of the institutional site visits.

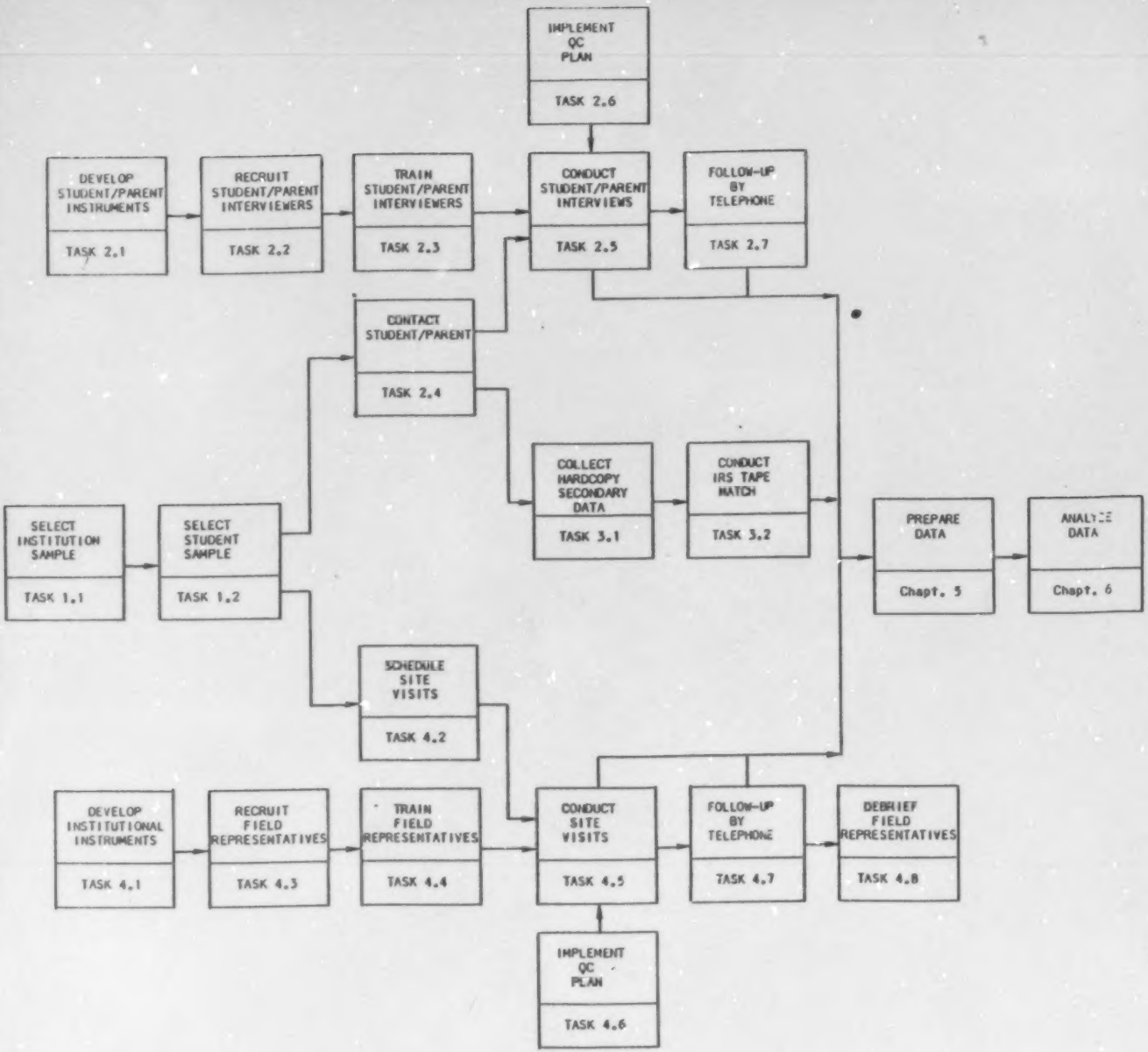

FIGURE 4-1

SUMMARY CHART SHOWING INTERDEPENDENCIES
OF DATA COLLECTION TASKS

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- ED will not wish to collect data on recipients who reside in Alaska, Hawaii, Puerto Rico, the Virgin Islands, and other U.S. territories. Field work will be confirmed to the 48 continental states.

- Recipients whose applications are selected by the Pell Grant processor for validation will not need to be oversampled, as was done in Stage One, in order to have a large enough sample to support accurate inferences about all validated students. From now on, all, or a large proportion, of the Pell population will be selected for validation.

Schedule Considerations and Constraints

As discussed in Chapter 2, the timing of the data collection can have an important impact on the ability of students, parents, and institutions to provide accurate data. The Pell Grant cycle extends from January when students begin to fill out application forms to over 15 months later in July when institutions begin to reconcile and close out their Pell Grant accounts. An institution sample can be drawn at any time during this cycle. However, the earliest point at which a recipient sample can be drawn is early to mid-fall, after institutions have calculated and posted their initial Pell Grant disbursements.

Ideally, from a design perspective, the data should be collected from students and parents immediately after sample selection. Students normally apply for Pell Grants in winter or spring preceding the academic year for which they are applying for aid. There is evidence that the longer after the application date that one waits to collect data the less reliable are the recall of the student and parent and the documentation provided.

There are reasons, however, why it may neither be feasible nor desirable to begin student and parent interviews and collection of secondary data in, for example, November after an October sample selection. First, selection of the recipient sample in the manner specified in this chapter may take 8 to 10 weeks. Lists of Pell Grant recipients must be requested and received from each sampled institution before a recipient sample can be picked and field work begun. Before secondary data can be collected, SARs of the sampled recipients must be requested and received from the sampled institutions. Even if a recipient sample could be selected quickly (i.e., by the beginning of November), student and parent interviews should not be scheduled for November and December because of the disruptions caused by the holiday season. Many students during this time are away from school or traveling and would be difficult to locate. Therefore, the optimal time to begin interviewing, both in practical and study design terms, would be January.

There is no ideal time for collecting secondary data, although obtaining documentation by mail may take longer during the holiday season, the busiest time for the Postal Service, and from January to April, the busiest time for the IRS.

Another important issue is the duration of the student and parent field work. Extending the field period over several months could have research design implications. Students and parents interviewed in January would have different characteristics than those interviewed in July. Those in the January group, for example, would tend to provide more reliable data than

those in the July group. A very complicated weighting scheme would have to be designed to allow for this design effect. Ideally, then, the field work should be completed in the shortest time possible.

While the student and parent interviews should be conducted in the winter, the institution site visits must be conducted in mid to late Spring. Information from student financial aid records cannot be abstracted until after institutions have posted the final Pell Grant disbursements of the year. For institutions on the semester system, posting normally occurs in January or February. However, for institutions on the quarter system and for many schools that use a clock hour system, it does not occur until March or April. The latest point at which institutional data should be collected is July, the beginning of the next Pell Grant award year. After that point, institutions have reconciled their students' accounts, and it would be very difficult for a data collector to discern "true" from reported data in a student's record. For example, it may be difficult to determine if statements of academic purpose or financial aid transcripts have been collected if data collection is conducted late in the cycle, since these records may no longer be easily accessible, particularly at institutions with highly automated systems.

TASK 1: SELECT SAMPLE

Information on students must be drawn from institutional files, and data on each student's institutional content must also be gathered during a site visit. Therefore, it is necessary to

cluster the students by institution and sample only the students from a select number of institutions. Although this group of institutions will be referred to as the "institution sample," those institutions will not, in fact, constitute a sample from which conclusions can be drawn about all such institutions in the United States. It will not be possible to estimate what proportion of all institutions have a certain characteristic or what the average institution's value is on any variable. It will be possible to say what proportion of students attend institutions with a certain characterisic or what the institutional score is on some variable for the average student. For example, it will not be possible to estimate what proportion of all institutions require a C average as evidence of satisfactory academic progress, but it will be possible to say what proportion of students attend schools with such a requirement; it will not be possible to say how many recipients attend the average institution, but it will be possible to say how many recipients attend the average recipient's institution.

Clustering, necessary for efficient site visit logistics, requires that the institution sample be drawn first.

Task 1.1: Select Institution Sample

Procedures

1. Determine the Sampling Frame. A sampling frame is a list of the population being studied from which a sample can be drawn. In the Stage One study, the PIMS Institutional Master File was used as the sampling frame. This was supposed to include all

institutions participating in the Pell Grant program. Although experience indicated that some schools on the list were no longer participating (some were defunct), this is still probably the most up- to-date and comprehensive list of participating institutions.

2. Stratify the Sampling Frame. Dividing the institutions in the sampling frame into several exclusive groups gives the researcher control over the probability of selection of various types of schools. In the Stage One study, for instance, a small number of large institutions were pulled from the list and set aside to be included in the study with certainty. Institutions in the 25 largest metropolitan areas were also treated separately because they have a large proportion of all Pell Grant recipients, and sending site visitors to all such areas posed no logistical problems. Institutions under the Alternate Disbursement System (ADS) constituted further strata.

Although stratifying the sample does permit the inclusion of some institutions with certainty, it also complicates the calculation of sampling errors and of the drawing of the sample in general. It is recommended that the inclusion with certainty of large schools and large metropolitan areas be reconsidered. Such large clusters will have very high probabilities of inclusion in any random-sample design, although not all of them will be included. Stratification should not be necessary to ensure that either large institutions or institutions in large metropolitan areas are included in the sample in proper proportion. For instance, large metropolitan institutions in the Midwest should

be adequately represented even if the Chicago, Detroit, Cleveland, and Milwaukee metropolitan areas are not all represented. Given the very large size of areas like New York and Los Angeles, it may be wise to make sure that they are included no matter how small the probability that they will fail to be selected; but the number of certainty metropolitan areas could be reduced. (For instance, is it important to ensure that Milwaukee, the 24th largest metropolitan area, be included, but not Cincinnati, the 26th--or that both Miami, the 23rd, and Tampa-St. Petersburg, the 25th, be included?)

3. Cluster the Sampling Frame. In order to reduce long-distance travel costs, the large number of institutions outside any metropolitan areas included with certainty should be grouped by location so that several institutions can be visited for the cost of a single airplane ticket. A limited number of clusters should then be chosen at random. The clusters should be as nearly equal in total number of Pell Grant recipients as possible. In the Stage One study, institutions were sorted by three-digit zip code prefix. Those areas were then grouped so that no cluster contained more than twice the average number of students or less than half; therefore, the largest cluster was not more than four times as large as the smallest cluster.

4. Determine the Size of the Sample. The size of the sample depends on the minimum confidence interval and maximum sampling error that can be tolerated when making estimates from the sample to the general population of Pell Grant recipients. The smaller the number of institutions included, the greater will be the

sampling error at a specified confidence interval. The students must be distributed among enough institutions to minimize the error but concentrated at few enough institutions to minimize travel costs. A sampling statistician will have to be consulted to make this determination.

5. Allocate the Sample among Strata and Clusters. If the sample is being stratified, the total number of institutions to be sampled must be divided among the strata. It will also be necessary to decide how many institutions will be selected from each chosen cluster. Just as concentrating the students among a few institutions will increase the sampling error, so will concentrating the institutions among a few clusters. On the other hand, the fewer the clusters to be visited, the lower will be the overall cost of collecting the data. Again, a sampling statistician will have to determine how many clusters to select and how many institutions per cluster.

6. Draw the Sample. The final step is to select the required number of clusters at random and then to choose the appropriate number of institutions at random from each cluster. Depending on the stratification used, institutions from several strata may be chosen from each sampled cluster.

Task 1.2: Select Student Sample

Drawing the student sample will be simpler than drawing the institution sample. It is assumed that about most recipients will be validated; therefore, it will not be necessary to stratify the sampling frame by validation status and oversample validated students, as was done in Stage One, in order to have a

large enough sample to support accurate inferences about all validated students. However, stratifying by size of award should be repeated because it may reduce the standard error but cannot increase it, at a small cost.

Procedures

1. Determine the Size of the Sample. The size of the sample depends on the minimum confidence interval and maximum sampling error that can be tolerated when making estimates from the sample to the population of Pell Grant recipients, and on the number of students drawn per institution (the cluster size). As the tables in Chapter 3 indicate, narrow confidence intervals, high significance levels, and large cluster sizes (small numbers of institutions) all increase the number of students or parents required. The size of the sample must also be limited by the funds available for data collection. Because of the interaction between the size of the institution sample (which determines the average number of students sampled per institution) and the size of the student/parent sample, the two sample sizes should be determined together by the same sampling statistician.

2. Determine the Sampling Frame. The sampling frame should include all Pell Grant recipients at sample institutions. A definite enrollment date, such as October 31 (the reporting date for the fall Progress Report), should be specified. This is especially important for proprietary institutions, which often have an almost continuous flow of new enrollments throughout the year.

3. Compile the Sampling Frame. Compilation of the sampling frame consists of securing a list of all Pell recipients attending each sample institution. There are two sources of this list: PIMS and the institutions themselves. PIMS can provide lists of recipients by grant amount and institution only for students whose SARs have been submitted with their institutions' fall progress report. Therefore, this source should be used only for institutions for which the number of SARs submitted matches the number of recipients claimed on the Progress Report. The use of PIMS data has three advantages. First, it obviates the expensive and time-consuming process, described below, of getting and processing recipient lists from the institutions. Second, it reduces the response burden on the institutions. Third, it avoids warning institutions that they will be visited and thus reduces the experimental bias which would result if they took special pains to reduce institutional error.

Institutions which do not file their Progress Reports on time or do not submit all their SARs will be asked to supply lists of their Pell recipients. A letter of request should be secured from the Deputy Assistant Secretary and accompanied by specific instructions on what is to be reported, the name, current address and telephone number, Social Security number, and grant amount for each recipient. Given the small number of letters involved, the letters should be individually typed and addressed and individually signed by someone with signature authority. Printed "Dear Colleague" letters can be expected to be treated less seriously, forcing delays and more extensive

follow-up efforts. A reminder postcard from the Project Director should be mailed to each institution a few days after the letter of request; a reminder letter, more urgent in tone, should be sent to each nonresponding institution no more than three weeks after the first letter. Depending on the time available, another letter should be sent two weeks before telephone follow-up begins. Institutions which have not responded after two or three letters should be called by telephone canvassers who have been taught the objectives of the study, exactly what information is needed, and how urgently it is needed. All communications with sample schools should note that participation in the study and compliance with the request for recipient lists is not voluntary.

Long lists from large institutions, at least, will have to be prepared for automated sorting and sampling. For the Stage One study, the largest lists were sampled systematically, only the information on every nth student being keypunched. Although this procedure introduces another source of sampling error, it may be the only practicable way to handle institutions with tens of thousands of recipients. Manual processing may be the quickest way to handle the smallest institutions.

4. Stratify the Sampling Frame. The sampling frame should be stratified by size of grant. This can be done most easily by ordering each institution's list of recipients from largest grant to smallest. Lists obtained from PIMS should also be sorted by grant size.

5. Draw the Sample. The sample of students will consist of a separate sample drawn from the recipient list submitted by each

institution. The sampling plan devised by the sampling statistician will specify how many students are to be drawn from each institution or how the number drawn is to be calculated for each institution. Each institution's list having been ordered by grant size, a systematic sample will be equivalent to a sample stratified by grant size. If the number of students drawn from each institution is the same, the skip interval will be different; in any case, a different starting point should be selected at random for each institution.

TASK 2: INTERVIEW STUDENTS AND PARENTS

This task involves visiting four groups of subjects: dependent students, parents of dependent students, independent students, and parents of independent students. However, except for the questions asked at the interview, the data collection process is the same; therefore, the specifications set forth here will deal with all four groups as a whole rather than individually. Participation is legally required of all but the parents of independent students, but every effort should be made to obtain maximum cooperation from this group. The data collection itself includes both an interview and abstraction of data from documents furnished by the interviewee.

Task 2.1: Develop Data Collection Instruments

A separate instrument must be developed for each of the four groups of subjects. Although many of the questions will be asked of all four groups, each must be asked a set of unique questions because of its status; some of the answers will be used to determine whether the correct status was claimed.

The instruments used in the Stage One study can serve as a basis for instrument development. This will reduce substantially the time and effort needed for this task.

Procedures

1. Specify Measurements and Measurement Levels

Based on the discussion in Chapter 2, decide what measurements must be made to perform the desired measurements of program error. Specify what level of measurement and verification is acceptable (from the student's or parent's word to notarized or IRS documentation).

2. List Data Needs

Draw up a list of the specific information items needed to carry out the measurements specified in step 1, indicating for each item whether it is needed from all four groups or, if not, for which ones.

3. Collate Stage One Instruments

Compare the list of data needs with the items included in the appropriate Stage One questionnaire to determine which items can be dropped from that instrument and which items must be added.

4. Evaluate the Stage One Instruments

Interview personnel at Westat, Inc., about the Stage One questionnaire, especially the data collection supervisors, coding supervisors, and others involved in any debriefing of interviewers or coders. Ask whether any questions proved to be vague or ambiguous, use terms unfamiliar to most respondents, cover topics which respondents could not answer, or have any other

problems. Ask staff involved in coding, interviewing, and data analysis whether the response categories were adequate for questions that might be repeated; whether some of the categories provided were used rarely or not at all; whether there were any frequent answers which did not have categories; and whether some open-ended questions could have been provided with codes.

5. Write Revised Draft Instruments

Delete questions which are not needed, add new questions at the appropriate points in the instrument, and revise any questions criticized in step 4. To maintain data comparability from one error study to the next, major revisions in existing questions (for instance, changing from an open-ended to a closed-ended question) should be considered very carefully and made only for strong reasons.

6. Test Instruments

After the instruments have been revised they must be tested with representatives of the groups to which they are addressed. Each questionnaire may be administered to a maximum of nine respondents without requiring approval by the Federal Educational Data Acquisition Council (FEDAC); this number should be sought for field testing. The field test respondents need not comprise a statistically representative sample of their population; rather, they should be chosen deliberately to include the types of respondents most likely to be encountered during real data collection. The two student groups (independent and dependent) should include married and single students, full-time and part-time students, on-campus and off-campus students, and students at

the five major types of institutions (public four-year, private four- year, public two-year, private two-year, and proprietary). The two groups of parents (of independent and dependent students) should include parents of the same types of students and, also, married, single, and remarried parents; if their cooperation can be obtained, the parents of the student field testers can be used to test the parent.

Field tests can be arranged with the cooperation of local institutions. To spread the burden of field testing, different institutions should be asked to supply testers than were asked in Stage One.

The field tests should be conducted as realistically as possible. Ask local institutions to refer students in the various categories to you and then call and ask for an appointment. Unlike the regular survey, participation in the field test is not mandatory. Administer the questionnaires to the students and parents in their homes or dormitory rooms just as if an actual survey were being done. Go through the entire questionnaire, asking all the questions but noting not only the tester's answers but also any difficulties or misunderstandings. At the end of the interview, ask a <u>few</u> additional questions about the respondent's opinions of the questionnaire--which questions were the most difficult, whether any were vague or irrelevant, etc.

The field test is also an opportunity to test some of the mechanics of data collection. The time required to administer the instrument should be noted, although well-trained field staff will probably take less time.

7. Revise Instruments

Collect the comments, criticisms, and suggestions of the field testers and analyze them for consistent patterns. Make the revisions these patterns suggest. When revising a question, be sure to make the change on all the forms on which that question occurs. If a question causes difficulty for one group of respondents but not for other groups, some difficulties may have to be accepted in order to keep the wording identical for all groups.

8. Secure FEDAC Approval

All questionnaires to be administered to 10 or more respondents must be approved by FEDAC. Approval requires the completion of a standard form (SF-83) and the submission of a supporting statement detailing the respondent burden (the number of hours required to answer the questionnaire), the reasons for asking each question, the uses of the data, the absence of suitable data which have already been collected, and the cost of data collection. Data collection activities must be listed in the Federal Register each February for the following year and must be included in the agency's "information collection budget." FEDAC clearance normally takes several weeks; two months should be allowed in the schedule. FEDAC may suggest or require changes in or deletion of individual questions.

The supporting statement can be based on the statement submitted with the Stage One clearance application. This should reduce both the preparation time and the clearance time, since many of the questions will have been justified and cleared already.

9. Produce Final Instruments

After any revisions have been made to satisfy FEDAC, and clearance has been obtained, the questionnaires can be printed for use in the field. Order at least 25 percent more questionnaires than expected respondents in order to have enough for office and administrative use, training, replacement of losses and spoilage, and a field margin caused by transfer of case loads, dismissal or resignation of interviewers, etc., which may not be accompanied by immediate recovery of the questionnaires supplied.

Task 2.2: Recruit Interviewers

To interview students and parents in a national sample, a large number of competent and well-trained interviewers are needed, located throughout the country. The student sample is clustered at a limited (if large) number of institutions which are clustered geographically themselves. Students can be interviewed in their dormitories or other housing close to their campuses. In most cases, their parents will also live nearby, but there is no assurance of this for any particular parent--some parents will live in areas far from sample institutions. Interviewers must be able to cover these areas as well as the locations of sample institutions.

Given the number of interviewers needed and their dispersion, the most efficient approach would be to contract the student and parent interviews to a survey research organization which already has a national corps of experienced interviewers on call. The procedures specified in the following for OSFA or some

other organization without an established corps of interviewers to hire an interview staff should demonstrate the impracticality of this approach. The entire process can be expected to take several months.

Procedures

1. Determine Interviewer Qualifications

Student and parent interviewers must be responsible and reliable, able to complete their assignments without full-time supervision. They must be intelligent enough to be trained quickly and able to respond or adapt to unpredictable situations or interviewer responses. They must be articulate in explaining the purposes of the survey and able to gain the confidence of strangers who may have good reasons not to cooperate with the study. All interviewers must have moderate arithmetic skills; a few truly bilingual interviewers, who can read, speak, and comprehend a foreign language (especially Spanish) will be needed. They must be able to act in a professional manner and present a professional appearance. In most cases, they will need assured access to an automobile and a valid driver's license. In many areas, they will have to be able to travel to nearby cities and other areas; in sparsely populated areas, this may involve distances over 100 miles. They also must be able to climb stairs, work in adverse weather, and occasionally conduct several successive interviews without a break. If interviewers are to be hired as temporary, part-time Civil Service workers, these requirements will have to be converted into Civil Service qualifications.

Although college students often make good interviewers because many of them have the requisite intelligence, articulateness, and flexible hours, care should be taken in hiring them for this project because they may identify too strongly with the respondents and be reluctant to "inform" on "colleagues." No student should be hired to interview other students at his own institution.

2. Determine Number of Interviewers Needed

The number of interviewers needed is a function of the number of students sampled, the time period available for the interviewing, the length of the interviews, and the dispersion of the interviewees. More interviewers will be needed the larger the sample, the shorter the time available for completion of the interviews, the longer the interviews, and the more dispersed the interviewees. Sample size and dispersion of respondents will have been determined before the sample was drawn. The length of each interview can be estimated from the field test. As explained at the beginning of this chapter, the field period should be as short as possible to avoid introducing a time variable into the study.

For the Stage One study, Westat hired over 200 people to complete 8,155 half-hour interviews in 10 weeks. Therefore, the average interviewer was able to complete only about four interviews per week.

3. Determine Distribution of Interviewers

Plot the addresses of sampled students and their parents by three-digit zip code area. In Stage One the average interviewer

completed 40 interviews in 10 weeks, but this rate varied according to the density of interviewees. In sparsely populated areas, 1 interviewer for 20 interviewees may be needed to complete half-hour interviews at the same rate; in densely populated areas, 1 to 80 may be sufficient. Using these or other appropriate ratios, distribute the total number of needed interviewers among zip areas or groups of adjacent zip areas.

4. Recruit Applicants

Given the extensive qualifications for interviewers listed above in step 1, it will be necessary to have a large pool of applicants for the interviewer positions. Moreover, interviewers will be needed from all parts of the 48 states. Some candidates may be secured from OPM files of applicants from other positions, and some existing permanent Federal civilian personnel may be assigned to temporary duty as interviewers. However, the remaining specifications for this subtask describe a procedure for hiring special temporary Pell Grant interviewers analogous to Census interviewers.

Compile a list of active survey research organizations, then write to them for assistance in identifying competent, experienced interviewers. Describe the purpose of the QC study, the role of the student and parent interviews, the interviewer qualifications, and when the interviews are scheduled to take place. This last item is important because most survey researchers do not have surveys in the field at all times everywhere. They do not want their interviewers pre-empted by another study, but they want their interviewers to be employed as continuously as

possible to keep them from taking other jobs and becoming unavailable for their own projects. The letter should be assigned by as high an official as possible, at least by the Deputy Assistant Secretary. Some organizations have interviewers all over the country, but many cover only specific regions, states, or metropolitan areas.

After a list of recommended interviewers has been compiled from the responses to this mailing, send a form letter to the people recommended inviting them to apply. Include not only background information about the survey, the interviewer requirements, and the schedule, but also business details such as rate of pay, and employee, status (whether full-time or part-time, temporary employee, or independent contractor, etc.).

This approach may not produce enough candidates in some parts of the country. In those areas, it will be necessary to place newspaper advertisements to recruit applicants. Since applicants will probably be needed from scattered areas around the country, advertisements should probably be placed through a commercial advertising bureau.

5. Screen and Interview Applicants

Screening and interviewing will have to be done regionally. Form letters inviting applications can include someone to contact in each regional office; newspaper advertisements should include only the nearest regional office. In Stage One, Westat had seven regional supervisors for this project.

The number of applicants interviewed for each area should be at least twice the number of interviewers needed for that area. Interviewing by telephone will probably be the only practical

method for isolated applicants in areas where few interviewers are needed, but interviews should be done in person wherever feasible, such as in major metropolitan areas.

For each area, rank the applicants interviewed and offer positions to the top-ranked people. Press for an immediate decision by applicants so that positions can be offered to others if the preferred candidates refuse.

Task 2.3: Train Interviewers

Although some interviewers may have experience with other surveys, that cannot be assumed; all interviewers must be trained in basic survey procedures and techniques. They also must be taught specific methods for this project and briefed thoroughly on the background of the study so that they will be able to answer respondent questions and will understand the procedures they have been trained to follow. It will probably be impractical to train all the interviewers in one place at one time. In the Stage One study a week was spent training supervisors and a week training interviewers.

Procedures

1. Develop Training Manuals

For the Stage One study, Westat developed seven documents for training supervisors and interviewers:

- A two-volume supervisor manual
- "An Introduction to Interviewing" which included background information and a general guide to interview techniques, including interviewing ethics and confidentiality
- "Home Study Guide for an Introduction to Interviewing," consisting of exercises with answers on the material in the Introduction

- A "Glossary/Document Index" containing definitions of technical terms used in the study and samples of the forms the interviewers would be using in the field
- A "Field Procedures Manual" detailing the procedures for securing appointments and recording and reporting results
- "Question-by-Question Specifications" detailing how to record specific answers and how to handle particular complicated situations

A similar set of training manuals will have to be developed for this project. Interviewers will take the field procedures manual, question-by-question specifications, and glossary with them, although they should not need to refer very often to the last of these if they have been trained well. Much of the Stage One material can be adapted to this study, especially the question-by-question specifications for items repeated from Stage One.

2. Schedule Training and Notify Interviewers

One-week training sessions will require paying hotel expenses for all interviewers, but travel expenses can be held down by regionalizing the training, which will also divide the trainees into more manageable groups. It is desirable that senior project staff be present at each training session to supervise and answer difficult questions; this limits the number of sessions which can be held simultaneously. There should not be more than a week between the end of interviewer training and field interviewing, lest interviewers forget too much of what they learned. In Stage One, four training sessions were held over a period of two weeks; this period could be extended to a third week by allowing interviewers trained during the first week to begin interviewing while

other interviewers were being trained in the third week. Nevertheless, there should not be more than six training sessions, three per week for two weeks or two per week for three weeks.

Interviewer training schedules should be determined early enough so that interviewers can be notified of the dates and location of their training when they are hired. If that is not possible they should be at least told of the date, or they should be notified of the training schedule as soon after hiring as possible.

3. Send Training Material to Interviewers

Send each interviewer a copy of the introduction to interviewing, the home study guide, and the glossary, with instructions to study these items before the training session. Pay the interviewers for a reasonable amount of time to spend studying, notify them that there will be a quiz on the material early in the training, and administer a quiz after the training orientation.

4. Train Field Supervisors

The regional interviewing supervisors need to be even better informed about the purposes of the survey and the field techniques than the interviewers, since they will be responsible for initial decisions when interviewers do not know what to do. They also must be thoroughly trained in the supervisory methods which will be used to assure the quality of the interviews. Since they will have to be experienced in both survey management and field interviewing, they will not need as much training in general

survey methods as the interviewers. The time saved can then be spent on supervisory procedures.

The supervisor training should include the following topics:

- The background and purposes of the project
- Item-by-item specifications for the questionnaires
- Project field organization
- Quality control procedures for verifying interviews
- Procedures for reporting to the central office and forwarding questionnaires

About five days should be spent to cover these topics thoroughly.

5. Train Interviewers

Interviewer training should use a variety of methods for efficiency and to hold the interviewers' interest. These may include:

- Formal lectures, illustrated where appropriate
- Training films
- Demonstration interviews
- Practice interviews between individual trainees and instructors
- Practice interviews between pairs of trainees
- Question-and-answer sessions

The progress of the interviewer trainees should be monitored both formally (through graded quizzes) and informally (through observation by the instructors) throughout; trainees who cannot meet minimum standards must be permitted into the field.

Lectures. Lectures are appropriate for the presentation of wholly new material, such as explaining the background and purposes of the study, introducing general interviewing techniques,

and describing administrative procedures. Trainees should be encouraged to ask questions during the lectures, and experienced interviewers can be called on to give examples of interview methods. Overhead slides or other illustrations such as handouts should be used to outline the material and emphasize essential points.

Training Films. Films or filmstrips are helpful in providing variety in the training sessions and in capturing the trainees' interest. Films on general interview techniques can be used for this purpose.

Demonstration Interviews. After the purposes of the study and general interview techniques have been introduced, a demonstration interview, in which one instructor plays the student or parent and another the interviewer, can lend a greater sense of reality to the training. The demonstration interview may precede or follow an item-by-item lecture on the questionnaire. At least two demonstrations should be included: one of a parent interview and one of a student interview. A good practice during a demonstration interview is to have a third instructor coding a questionnaire in response to the demonstration answers, with the trainees marking copies of their own and checking their codes against the overhead.

Practice Interviews. It is important that each trainee practice each of the interviews at least once; skip patterns and other difficult sections should be practiced more often. Initial practice interviews should resemble the demonstrations, with an instructor taking the role of the parent or student and other

trainees observing. Instructors should take careful note of any mistakes made by the trainee interviewer but should not interrupt the interview except to correct a major error such as following the wrong skip pattern. Trainee observers can be asked to list mistakes at the end of the demonstration; for discussion by the group, those not listed should be brought up by the instructor. Trainees who are experienced interviewers should participate in these demonstrations.

Given the amount of time and the number of instructors probably available, trainees will eventually have to be paired, one doing the interview and the other playing respondent. If these practice interviews are done in various corners of a large room, an instructor can be available to answer specific questions on signal (such as when neither member of the pair knows how to proceed after a certain point) and to oversee a portion of each practice interview. After each round of practices the group can be reassembled for a discussion of problems encountered.

In all practice interviews, the "respondent" should have a script or list of answers to the questions, so that the training staff can be sure that all trainees encounter the same situation and cover the same material.

Question-and-Answer Session. Open opportunities for all trainees to ask questions should be built into the training schedule. At least one should be devoted to each questionnaire and one to field procedures. A summary session in which questions can be asked on anything about which interviewers are uncertain should be scheduled near the end of the training.

Evaluation and Retraining. Minimum training standards should be established before the training begins. Formal quizzes and observation should be used to evaluate the trainees. Those who appear to be having trouble learning important items, or who do not get minimum scores on the quizzes, must be given additional training in the evening, after the regular schedule. Trainees who still cannot meet the training standards must not be allowed into the field.

Task 2.4: Contact Students and Parents

An unexpected telephone call from a person whom the person being called does not know is an unfavorable context in which to secure an appointment for a survey interview, especially when the survey is of the nature of an investigation. Therefore, sampled students and parents should be informed of the survey before hand in a less threatening context.

Procedures

1. Draft Letters and Forms

Write letters for the signature of the director of the Division of Quality Assurance or of the Deputy Assistant Secretary, informing independent and dependent students of thier selection for the survey, and informing parents of independent and dependent students of the selection of their children for the survey (four somewhat different letters in all). Include in the letters information about the purpose of the study, a notification that an interviewer will be calling to arrange an appointment, instructions on what documents to have ready for the interview, a

reminder that participation is not voluntary but part of the terms of the Pell Grant, and a telephone number to call for further information.

Compile a checklist of all the documents which might be requested from any of the four types of respondents. The following should be included in the letter:

- An "IRS Form 4506, Request for Copy of Tax Form" if the SAR indicated the student/parent filed a tax return with a request that they sign it, provide certain key information such as the parents Social Security numbers, and return it to the project office
- A request to respondents who indicated that they own a home to provide the name and address of their tax assessor's office
- A release form to those who reported AFDC benefits with a request that they provide the name and address of their local public assistance office
- Several copies of a "Financial Institution Authorization to Release Information" to those who claimed to have more than $4,000 in checking and savings accounts at the time of application

2. Compile Mailing List

List the mailing address of each student in the sample. A current address for each Pell recipient should have been included on the recipient lists from which the student sample was drawn. Parent addresses should also have been included but may not have been, especially for parents of independent students. Write again to institutions which omitted the addresses, enclosing a list of the students sampled and requesting current student and parent addresses.

For students drawn from PIMS files because their schools had sent in the SARs of all current recipients with the fall Progress

Reports, student but not parent addresses should also be available. Write to these students' institutions for missing student addresses and for parent addresses.

3. Send Letters and Forms

Secure enough envelopes with the project address and "Address Correction Requested" printed on them (allow about 10 percent extra for spoilage, replacements, etc.). The Postal Service is supposed to provide forwarding addresses for addressees who have moved for 25 cents per address. To the extent that this is done, tracing students and parents will be easier.

Send the appropriate letter to each student and parent, enclosing the check list indicating the documents required from each individual and the tax return release form.

Task 2.5: Conduct Interviews

Parents and students should be assigned to individual interviewers by regional interview supervisors on the basis of geographic propinquity, interviewer preference, and language. Interviewers will have to set their own schedules.

Procedures

1. Assign Students and Parents to Interviewers

The number of interviewers hired in each region and zip code area or group of areas should correspond to the estimated number of students and parents to be interviewed there. In some areas, there will be just one interviewer, to whom all the respondents will have to be assigned. Large metropolitan areas and, perhaps, few communities where large public universities are located, will have several interviewers. Regional interview supervisors should

assign about half of their interviews in these areas. In most cases each subject should be assigned to the nearest interviewer, based on the respective addresses. If the supervisor has reason to suspect there may be a parental language problem, and a bilingual interviewer is available, the bilingual interviewer should be assigned to those parents. In many cases, it will be possible for a monolingual interviewer to conduct the interview through an interpreter, such as a family member who speaks English. All students may be presumed to speak English.

Set aside time in the training schedule for interviewers from metropolitan areas to trade assignments based on the neighborhoods they would prefer to visit. Regional supervisors must approve these arrangements to hold down travel costs. The training session will probably be the only time the interviewers are together.

Attempts by interviewers to schedule interviews will reveal some address changes. In most cases, the subjects will have moved only a short distance, and the interviewers can schedule interviews as if no move had been made. Long-distance moves will require referral to the cases to the regional supervisor for reassignment to another interviewer (if the respondent stayed in the same region) or, through the regional supervisor, to the supervisor in another region.

As reassignments for these reasons are made, the overall load on each interviewer will become more apparent. After about a third of the field period has passed, regional supervisors should assign the remaining cases.

2. Schedule Interviews

Instruct interviewers to attempt to schedule individual interviews in advance by telephone whenever possible, and provide them with scripts for doing so. The first few days of the field period should be spent making these telephone contacts.

Some respondents will not have telephones, or attempts to reach them by telephone will be unsuccessful. Instruct interviewers to substitute personal visits in these cases. They should conduct the interviews immediately whenever the respondents will permit it.

3. Deal with Refusals and Avoiders

Interviewers should remind refusers and avoiders (subjects who do not refuse but consistently fail to keep appointments or find excuses for not making them) that participation in the study is required (except of parents of independent students) only after trying to gain cooperation voluntarily by answering questions (explicit or implied) and attempting to conform to the subjects' schedules.

4. Conduct Interviews

Interviews for the Stage One study were designed to average about half an hour each--half that for parents of dependent students. Therefore, only a minority of interviewers' time was spent actually conducting the interviews. A half hour is usually considered to be about the maximum time for which a respondent's attention can be held without causing impatience, hostility, or an outright break-off. Therefore, questions should not have been

added to the Stage One questionnaire unless other questions which would take about the same time were deleted.

Note that the "interview" includes not only questions asked by the interview and answered by the respondent, but also the interviewer's examination, on the spot, of documentation of the recipient's income and status.

5. Edit Questionnaires

Interviewers must edit their questionnaires as soon as possible after the interview--no later than the end of the same day. Nonstandard abbreviations used in recording comments or open-ended answers must be explained, illegible handwriting must be clarified, and zeroes must be filled in where appropriate. All answers must be checked against the question-by-question specifications and errors, omissions, or anomalies attributed to the respondent or interviewer.

6. Return Questionnaires

Establish field procedures for the shipment of survey instruments to the project office for coding and data entry. They should be routed through regional supervisors for quality control (see next subtask) and sent in at least once a week.

Task 2.6: Implement Quality Control and Supervision Plan

Quality control measures in the field are specified here. Two other quality control measures are specified elsewhere: immediate post-interview editing by the interviewers in Subtask 2.5 and editing at the project office in Chapter 5.

The steps described here are vital in assuring that the data will be as complete and correct as possible, collected on time, and within budget.

Procedures

1. Coordinate Interviewers

Reassign cases which are potentially completions (i.e., are not important to complete because of untraceable address, refusal, death of respondent, etc.) but cannot be completed by the interviewers to whom they were first assigned. Assign new cases which have been added to the region because of respondent moves and cases which were held back at the beginning of the field period.

2. Edit Questionnaires

Edit a sample of questionnaires transmitted by interviewers. A few cases chosen randomly should be edited item-by-item to make sure that interviewers understand how to fill out the questionnaire and are doing proper field editing. The first few cases by each interviewer should be edited in this way (the first three by each interviewer were done in Stage One). Report interviewer and repondent errors to the project office for the tabulation. If a systematic error appears across a number of interviewers, there may be a problem with the instrument; a solution will have to be devised and all supervisors and interviewers informed of the new procedure.

3. Verify Interviews

Verify a small random sample of each interviewer's work by telephoning the respondent and confirming the date and time of

the interview, asking whether the interviewer asked to see key documents and actually reviewed them, reasking a few key questions, and inquiring whether the interviewer was impolite, hostile, or late for the interview. Reinterviewing is the only way to determine what interviewers are really doing in the field and the only way to guard against "armchair interviews," the filling out of instruments with bogus data without ever visiting the respondent.

If an armchair interview is discovered, all of that interviewer's completed cases must be verified. The interviewer must be dismissed and uncompleted or bogus cases reassigned. Failure to review documents or ask key questions may indicate interviewer dishonesty or merely a misunderstanding of the questionnaire. The interviewer should be called immediately and the situation clarified; if he is seeking shortcuts or deliberately evading his responsibilities, he must be dismissed. Less serious problems such as rudeness or an occasional missed question must be resolved at the next regular telephone conference (see step 4, below).

4. Supervise Interviewers

Keep careful records of the assignment of cases to interviewers. Schedule a regular weekly time for each interviewer to report to his supervisor by telephone the status of each case assigned to him (interview completed and questionnaire forwarded for coding, refusal, still trying to contact respondent, interview scheduled, etc.). Discuss any of the less serious problems mentioned above which have been found in verification. Skipping

questions and interviewer rudeness can comprise the study if they are widespread and consistent; they do not require immediate dismissal of the interviewer, but they must be dealt with firmly.

If an interviewer does not have good reasons for not completing interviews at the expected rate, some of his cases may have to be reassigned. Some interviewers will have runs of bad luck during which respondents will be unlocatable, evasive, and uncooperative; cars will breakdown; weather will interfere with travel; and they will fall ill. When these problems are cited frequently over several weeks, the supervisor must try to determine whether the interviewer is really fulfilling his responsibilities.

5. Assign New Cases

Refer respondents who have moved to different regions to the supervisors of those regions; the supervisors will be responsible for assigning those cases to individual interviewers. As some interviewers complete their initial assignments, the supervisor will also be responsible for assigning the cases which were held back initially.

6. Control Expenses

Require interviewers to report to their supervisors weekly by telephone on the time they spend in the field and their expenses. Supervisors should forward these reports to the project office, where checks should be issued promptly; this will greatly enhance interviewer morale. Telephone reports should be followed by signed statements and receipts sent to the field supervisors, who should examine them before sending them on to the project

office. Supervisors should compare each interviewer's time report with the activity (interviews completed, appointments made, appointments broken by respondents, etc.) reported for the same week, checking to see that accomplishments are reasonable in relation to time charged and that expenses such as mileage correspond to the type of area and number of appointments. Apparently unreasonable charges must be discussed with the inteviewer during the next telephone report. Amounts disallowed by the supervisor should be deducted from the interviewer's next payment. Final payments should be withheld from interviewers who have had more than one such disallowance until all accounts are reconciled.

Give the interviewers an explicit statement of what expenses will be allowed when expense reporting is discussed during training. If expenses are allowed for meals, place a reasonable limit on the amount. Expenses should be approved by supervisors in advance for any trips to isolated subjects which require overnight travel and accommodations.

Task 2.7: Follow up by Telephone

When missing, illegible, illogical, or inconsistent data are discovered in any of the data preparation steps--receipt, manual editing, or machine editing--an effort must be made to contact the responsible interviewer, the student, or the parents. Based on past experience, this task, although extremely important in ensuring complete and reliable data, does not require a large amount of staff time. In the Stage One study, Westat recontacted

only 340 students and parents out of a total sample of roughly 8,000.

Several of the coding staff should be trained to conduct the telephone interviews. Training need not last longer than one day. It should cover the following topics:

- Beginning the interview--how to gain cooperation and establish rapport with a respondent during the introduction
- Using the questionnaire--how to ask the questions
- Probing--how and when to probe the respondent for additional information
- Editing the interview--how to end the interview with the respondent

The training session should end with practice telephone calls that simulate different types of respondents and responses.

Procedures

1. Send Instruments to Telephone Station

Coders and receipt clerks refer all cases that have omissions, illegible answers, or illogical responses to a coding supervisor who decides which cases warrant telephone follow-up. On those cases that do, the supervisor decides who should be called, the field interviewer or respondent, then forwards the instruments to the telephone interviewers.

2. Telephone Respondent or Interviewer

The telephone staff calls students, parents, and interviewers as cases are referred. Telephone numbers for students and parents should be available from the respondent control file created during the sampling stage of the study. The telephone

staff must be diligent in attempting to contact and get the cooperation of students and parents.

3. Code Response

Specific items are recoded based on the new data collected in the telephone conversation.

TASK 3: COLLECT SECONDARY DATA

The primary objective of the student and parent data collection effort is to obtain data that validate information on the Pell Grant application. During the field work, interviewers ask students and parents to show them verifying documents. Specific line item dollar amounts from the documents are then coded on the interview forms. There are several problems with collecting documentation only from students and parents during the in-person interview. Many respondents, even with considerable advance notification, will be unable to provide documents at the time of the interview. In other cases, the documents will not validate the information entered on the application because they are not up to date as of the time the application was submitted. Finally, much documentation received directly from students and parents will not be totally reliable. For example, students and parents will often show the interviewer uncertified working copies of their tax returns.

In light of these documentation problems, it is strongly recommended that additional major validating documents be obtained directly from the issuing institution or governmental agency. In the Stage One study, documents were collected from

the IRS to verify adjusted gross income, taxes paid, and medical and dental expenses, from banks to verify cash and savings, and from local tax assessors to verify home value. For future error assessments, documents could also be collected that would validate AFDC now that it is a separate line item on the application form. (Prior to 1981-82 all nontaxable income was included in one line item.) In addition, computer tapes could be collected from the IRS as additional verification.

Task 3.1: Collect Hard Copy Secondary Data

Procedures for collecting hard copy verifying documentation are relatively straightforward. Student Aid Reports (SARs) are collected from each sampled institution and then reviewed by a home office coder, with the guidance of the professional staff, to determine which documents will be needed to validate the information entered on the application. The respondent is then provided with a letter for each institution or agency from which documentation is needed. The letter, which must be signed by the respondent, will authorize release of the information directly to the project officer. Once the authorizing letters are returned to the project office, they are sent to the appropriate agency. Experience suggests that most agencies need five to seven weeks to provide the requested data and that the entire process--from requesting SARs from institutions to receiving documentation from the appropriate organizations or agencies--requires 16 to 20 weeks.

Procedures

1. Request SARs from Institutions

Send a list of the students selected for study participation to each sampled institution with a request for copies of the SAR on file for each of the selected students and a current mailing address and phone number.

2. Telephone Institutions That Do Not Respond

Two weeks after mailing the initial letter, begin to call institutions that have not sent SARs. Of the 307 institutions sampled for participation in the Stage One study, 305 institutions cooperated in sending copies of the SARs.

3. Review and Key Enter SAR Data

Using procedures detailed in Chapter 4, "Data Preparation," code addresses and SAR information onto a coding sheet. From a review of the SARs, list the respondents needing a release form for the IRS, AFDC, banks, and/or tax assessors. Key punch data from the SAR coding sheet. The SAR file can be used to create mailing labels, instrument labels, and a Master Receipt Control Log (see Chapter 4). Eventually the SAR file must be merged with other data sets collected during the course of the study.

4. Send Release Forms and Other Information to Students and Parents

Mail students and parents a letter of introduction and a package of materials to assist them in preparing for the interview. Include in each package a list of documents that the student or parent will be asked to show the interviewer. "Customize" this list for each respondent, based on information from the

SAR. The following should be included in the package:

- An "IRS Form 4506, Request for Copy of Tax Form" if the SAR indicated the student/parent filed a tax return with a request that they sign it, provide certain key information such as the Social Security numbers of both parents (if dependent) or the Social Security number of the spouse (if independent), and return it to the project office
- A request to respondents who indicated that they own a home to provide the name and address of their tax assessor's office
- A release form to those who reported AFDC benefits with a request that they provide the name and address of their local public assistance office.
- Several copies of a "Financial Institution Authorization to Release Information" to those who claimed to have more than $4,000 in checking and savings accounts at the time of application

Finally, it is important that an "information update sheet" be enclosed in the package for the student or parent to fill out with current names, addresses, and telephone numbers. To ensure a prompt response, a preaddressed postpaid envelope labeled with the respondent's study identification number should be enclosed in the package. (See Task 2.4 for further details.)

5. Telephone Students and Parents That Do Not Respond

To ensure that the project's schedule does not lag, telephone students and parents who do not return their release forms within three weeks.

6. Obtain IRS Forms

Once all IRS Request for Copy Forms are returned, send them to the appropriate regional IRS Service Centers. Expect five to seven weeks for the IRS to return photocopies of tax returns, longer if the request is made between January and April, the busiest time of year for the IRS.

7. Obtain Tax Assessor Records

Verify the names and addresses of local tax assessors provided by students and parents against a roster of names and addresses that is available from the International Association of Assessing Offices. Once the addresses are verified, send letters to the assessors which provide the name and address of each home owner and which request the following information:

- Frequency of assessment
- Assessment value as of date of Pell Grant application
- Formula for determining the fair market value

It may be necessary to contact some of the assessor offices by telephone in order to clarify the request and obtain the information.

8. Obtain Documentation from Financial Institutions

Once they are returned from students and parents, send release forms to banks and other financial institutions.

9. Obtain Documentation from Public Assistance Offices

Once they are returned from students and parents, send release forms to public assistance offices.

Task 3.2: Conduct IRS Tape Match

It may be desirable to conduct an identifiable tape match with IRS data in addition to--or in lieu of--collecting hard copy 1040 and 1040A tax returns from regional IRS Service Centers (Task 3.1, Step 6). In deciding whether or not to conduct a tape match, the following issues should be considered:

- Timing of the Availability of IRS Data
  The tax return filing deadline is April 15. However, full tax return data are often not available on

computer tape until October or November of the same calendar year. This fact should not adversely affect the schedule of the error study if, as recommended earlier in this chapter, the recipient sample is not drawn until late September or early October.

- Logistics
  The IRS requires that all data matches occur at one of its facilities. This adds logistical complications and may add to the time required to complete the error study.

- Legality of Data Match
  Currently, legislation and regulations governing the IRS require that a release form which meets IRS requirements be signed by each tax payer before individual IRS data can be released. Release forms would have to be collected from recipients and parents (Task 3.1) if either a tape match is conducted or hard copy tax return data are collected and processed.

- Match Rate
  A major shortcoming of many tape matches is the low rate of successful matches. Two factors contribute to the low rates. First, many Pell Grant recipients do not file a tax return. In the approach specified here, the SARs of all sampled recipients would first be reviewed; only the release forms and information of those who indicated on their Pell Grant application that they filed a tax return would be forwarded to the IRS for the match. Second, incorrect linking identifiers are used in attempting to conduct the tape match. For an IRS tape match, the parents' Social Security numbers (SSNs) for dependent recipients and the recipient's and spouse's SSNs for independent recipients would be the linkage media. As described in step 4, the required SSNs must be collected from recipients and parents along with signed release forms. Steps should be taken to ensure that the SSNs provided the IRS are correct. Coding and key punching of SSNs should be 100 percent verified before a tape is sent to the IRS. It may be desirable to verify SSNs during field interviews of students and parents.

- Data Comparability
  Another major concern in tape matches is the equivalence of the data to be matched. The definitions of the data required on the Pell Grant application are not always consistent with the data maintained by other agencies. For example, data from the Pell application on annual VA educational benefits is not compatible with data maintained by the VA on VA educational benefits. However, for most cases, there should be no

compatability problems with the IRS. Definitions for AGI and Federal taxes paid, the two items of most concern in a Pell/IRS match, are identical. Problems, however, arise in cases where parents of dependent recipients are divorced or separated. In these cases, the Pell application requires the AGI and taxes of the parent who supplied more than half of the dependent student's support. If the parent remarries and files a joint return with the new spouse, or remains unmarried but still files a joint return with the former spouse, it is impossible to separate the Pell-defined AGI and taxes from IRS files. In an error study, the divorced and separated cases would not be screened out before the IRS file match. Instead, they would have to be dropped during the final file merge which creates the "best value" data file for analysis. (See Chapter 5, Task 7, for details.)

Procedures

1. Create Tape to Submit to IRS

Once all SARs of sampled recipients have been received from institutions (Task 3.1, step 1), and release forms and required SSNs have been received from students and parents (Task 3.1, step 4), create a tape to provide the IRS for the record match. The special tape should include only the data of those recipients whose SAR indicates they or their parents filed a tax return. Each record on the tape must include the parent(s) SSN(s) (if dependent) or the recipient's and spouse's SSNs (if independent), and the study identifier for each case.

2. Submit Tape and Release Forms to the IRS

Provide the IRS with the tape containing the selected records and the appropriate release forms. The IRS must match the data with their files based upon the parent's SSN (for dependents) or the student's SSN (for independents). If a match is found, the IRS must add the parent's (if dependent) or student's (if independent) AGI and taxes to the record. If no match is found, IRS must add a "no match" flag to the record.

3. Merge Returned IRS Tape with Study Data

After the tape is returned from the IRS, merge it with other study data. (This procedure is discussed in detail in Chapter 5, Task 7.)

TASK 4: COLLECT DATA FROM INSTITUTIONS

Task 4.1: Develop Data Collection Instruments

Three instruments are developed during this task: the Student Record Abstract (SRA) for recording data from student financial aid files, the Institutional Questionnaire (IQ) for recording the responses of financial aid administrators during formal interviews, and the Corrections Control Group (CCG) form for recording the corrections behavior of a special control sample of recipients.

Instrument design, although extremely critical to the data collection, need not be time consuming since the instruments used for each annual error assessment can be developed from the prior year's instruments. The exact content and design of the instruments for the next assessment--and for each subsequent annual assessment--will depend both on the data needed to satisfy the analytic needs of the assessment and on an evaluation of the prior year's instruments.

Procedures

1. Design First Draft of Instruments

Construct a draft of the three instruments based on a review of the data needs and an evaluation of the effectiveness of the

prior year's instruments. Attention should be paid to the following:

- Length of Instrument. The length of the instrument is very important. A long instrument may unnecessarily increase the length of the interview, the amount of time spent at each institution, and the workload of field representatives, coders, keypunchers, and data analysts.

- Clarity of Questions and Instructions. Interview questions should be worded in such a way that the financial aid officer answers without needing instruction on how to respond or an explanation of the intent of the question.

- Order of Questions. Interview questions should be arranged in a logical sequence.

- Format. The instrument format should facilitate the work of the field representative, coder, keypuncher, and systems analyst.

2. Develop Other Data Collection Materials

All materials and forms to which financial aid administrators and other institutional officials are exposed must be included in the FEDAC/OMB package and, therefore, must be developed at this stage of the study. These materials include:

- A letter sent to the presidents and financial aid officers of the sample institutions describing the study and asking for their participation.

- A letter sent to the financial aid officers outlining in detail the procedures the field representatives will follow during the site visits, requesting that the institution send a list of all its Pell Grant recipients for the purpose of drawing a student sample, and requesting that the institution give an indication of the time or times most convenient to schedule a site visit.

- A follow-up postcard sent as a reminder to financial aid officers who fail to return their list of Pell Grant recipients.

- A record of disclosure, satisfying the conditions of the Privacy Regulations, issued to each student whose file is reviewed.

Further discussion of the purpose and content of these materials is found in Task 1.2, "Select Student and Parent Sample" and Task 4.2, "Contact Institutions and Schedule Site Visits."

3. Contact Institutions for Field Test

Contact at least three institutions local to the project office and ask them to participate in the field test of the draft set of instruments. Public, private nonprofit, and private institutions should be represented in the field test sample.

4. Conduct Field Test

Visit the participating institutions in two-member teams and enact a typical day of data collection. First, interview the financial aid administrator. While one member asks the questions, the other takes detailed notes on the length of the interview, the flow of the interview, and any difficulties the respondent is having with the questionnaire. After the interview, discuss the questionnaire with the financial aid officer highlighting any questions that may need improvement. Next, select at random the files of approximately 10 Pell Grant recipients. While one member reviews the files, the second takes detailed notes on the use of the Student Record Abstract and on any problems that might be encountered in locating and interpreting financial aid data.

5. Revise Data Collection Instruments

Analyze the results of the field test and revise the instruments as necessary.

6. Conduct Second Field Test

It is advisable to conduct a second field test to appraise

the effectiveness of the revised instruments. The second test need not be as extensive as the first. For the second test, visit two institutions not visited for the first test. Select no more than three files to review at each institution.

7. Revise Data Collection Instruments

Review the results of the second field test and construct a final set of instruments.

8. Prepare and Submit Clearance Package

Once the instruments are finalized, submit the FEDAC/OMB clearance package. Preparation of the clearance package need not be a time-consuming task since large sections of Advanced Technology's Stage One package can be used as "boilerplate" for future packages. (Clearance requirements do not change substantially from year to year.)

In completing the package, adhere closely to the instructions set forth in the Standard Form 83, "Request for OMB Review." The forms clearance package should consist of the following:

- A completed SF-83
- Copies of all instruments
- Copies of other data collection materials
- A matrix which links specific research objectives with specific items on each instrument
- A supporting statement which includes the following:
  - the study's objectives
  - a review of prior related studies and a discussion of the circumstances that make this survey necessary

- the analysis strategy
- the types of information to be collected
- the sampling plan and the statistician who approved the plan
- expected response rate and how nonresponse will be handled
- estimates of respondent burden and steps to be taken to minimize respondent burden
- pretest results
- discussion of any sensitive questions
- procedures used to protect confidentiality
- tabulation and publication plans
- a schedule for data collection and publication
- a list of consultations held outside the project office
- an estimate of costs to the Federal Government

Task 4.2: Schedule Site Visits

The purpose of this task is to:

- Contact the sampled institutions and request that they participate in the study.
- Request that the institutions send a list of their Pell Grant recipients to the home office for the purpose of drawing a recipient sample.
- Schedule the site visits with an eye towards minimizing travel costs.

Procedures

1. Send Initial Contact Letter to Institutions

As soon as an institutional sample has been drawn, send a letter to the presidents and financial aid officers at the institutions describing the purpose of the site visits, emphasizing

their importance, outlining relevant privacy regulations, and asking for their participation.

2. Send Second Letter to Financial Aid Officers

Send a follow-up letter to the financial aid officers only. This letter should include the following:

- A request that the institution send a complete and current list of Pell Grant recipients (see Task 1.2 for details).
- A detailed description of the procedures the field representatives will follow during the site visit.
- A request that the financial aid administrators notify the registrar, bursar, and other officials at the institution from whom information will be collected regarding the proposed visit.
- A request that the financial aid officer inform the home office of the time or times most convenient to schedule a visit.

3. Recontact Institutions That Fail to Submit Recipient List

A series of procedures must be followed to collect recipient lists from institutions which do not promptly respond to the second contact letter. These procedures include a reminder postcard, telephone follow-up, and visit to institutions to draw a sample on-site. These procedures are discussed in more detail in Task 1.2, "Select Student Sample."

4. Construct Initial Master Site Visit Schedule

Establish a site visit schedule for each field representative prior to the training week and insist that each adhere to it. By putting time and effort into planning the site visit logistics--including planning and making airline, hotel, and car rental arrangements--substantial cost savings can be realized.

The following is the list of steps to be followed in constructing the initial schedule:

1. Plot institutional sites on large wall map.

2. Divide map into regions, with each region assigned to a field representative. Each region should represent approximately the same number of work days, travel days, and rest days. In an effort to minimize costs, every effort should be made to capture geographic clusters of institutions when drawing these regions.

3. For each region, draw efficient travel cycles. At this point it is necessary to investigate airline and rental car schedules and rates.

4. Assign tentative appointment dates to each institutional site.

5. Telephone Institutions to Arrange Visits

After the tentative scheduling is complete, call the institutions to set appointments, learn of vacation periods, and determine the accessibility of their financial aid files and other data needed for the record abstracts.

6. Adjust Site Visit Schedule as Necessary

Adjust the schedule. Scheduling appointments by phone rather than by letter allows for immediate revision of schedules within a region when it is learned that a tentative appointment date is inconvenient for a particular site.

Task 4.3: Recruit Field Representatives

To a great extent, the success of the institutional data collection depends on recruiting individuals who have prior institutional financial aid experience. Financial aid professionals and others with extensive knowledge of the information requirements of the Pell Grant and Campus-Based programs have the

following specific advantages over those with no financial aid experience:

- The ability to effectively interview financial aid officers, including being able to probe for meaningful responses, to recognize significant answers, and to know when impressive sounding jargon is actually vague or meaningless.
- The ability to collect data on individual students quickly and efficiently, given their familiarity with the record-keeping practices of institutions of higher education.
- The ability to collect reliable and complete data on individual students, given their knowledge of Federal financial aid regulations and the various financial aid forms and reports.
- The ability, in debriefing sessions, formal reports, or the margins of questionnaires, to make knowledgeable observations about the workings of financial aid programs.

Individuals with hands-on experience conducting Pell Grant validation make particularly attractive candidates because much of the institutional site visit work involves abstracting data from the tax returns, bank statements, ED validation forms, and other verifying documentation collected by financial aid officers to comply with ED's validation regulations.

In addition to experience in student financial aid, all applicants for the field representative positions should be judged on the following criteria:

- Education--a minimum of bachelor's degree required with an advanced degree in an appropriate field desired
- Interviewing experience--prior experience on similar studies with knowledge of research and survey methods
- Oral Communication Skills--speaks clearly, exhibits maturity, listens well

- Responsibility--has held a position of responsibility, and is capable of working with little supervision
- Endurance--in good physical condition, capable of working at a fast steady pace, has travel experience

Procedures

1. Advertise for Financial Aid Professionals

Advertise field representative openings in the Chronicle of Higher Education, the NASFAA Newsletter, and the Sunday edition of key large-city newspapers. For the Stage One study, Advanced Technology was able to attract nearly 100 resumes by using these advertising sources. Nearly all the applicants were financial aid professionals either between jobs or able to arrange a temporary leave from their current positions. A summary of the Stage One advertising/hiring results is shown in Figure 4-2.

2. Interview by Phone

Screen resumes and interview the most qualified applicants by phone. For a nationwide search, phone interviewing is efficient and permits the employer to talk with a large number of candidates in a short period of time.

3. Interview in Person

Interview finalists in person and hire the most qualified.

Task 4.4: Train Field Representatives

The caliber of a training program is directly reflected in the quality of data obtained. The objective of training is to provide the institutional field staff with the exact knowledge required to collect precise data for the study. Through carefully developed training, using methods that emphasize the

FIGURE 4-2

RESULTS OF INTERVIEWER ADVERTISING/HIRING
FOR STAGE ONE QC STUDY

Sources	Resumes Received and Reviewed	Interviewed by Phone	Interviewed in Person	Offered Interviewing Position	Accepted Position
NASFAA Newsletter	18	10	6	5	3
Chronicle of Higher Education	35	12	6	4	4
OSFA Bulletin	0	0	0	0	0
Boston Globe	9	1	0	0	0
Chicago Tribune	3	0	0	0	0
Houston Chronicle	0	0	0	0	0
Los Angeles Times	0	0	0	0	0
New York Times	8	3	1	1	1
Washington Post	6	3	1	1	1
Other	7	6	5	4	4
Cannot Determine	9	1	0	0	0
Totals	95	36	19	15	13

NOTE: The following local organizations were also contacted to identify potential candidates in this area:

1) NASFAA
2) Prince Georges Community College
3) University of Maryland
4) American University
5) George Washington University
6) NOVA - Alexandria
7) Joel Packer - U.S. Student Association
8) Applied Management Sciences

importance of consistency, accuracy, and efficiency, this objective can be accomplished.

Due to both the complexity of the data collection and the importance of a well-trained field representative to the overall study, a minimum of five days is required to complete an effective training program. If financial aid professionals or experienced DCPR program reviewers are recruited, little time is needed to cover Federal student aid regulations and procedures. Instead, the training should focus on the purpose of the study, the purpose of survey research, interviewing techniques, and the precise procedures to be followed when abstracting data from student financial aid files.

Procedures

1. Develop Training Manuals

Develop two manuals for the training program and for use by the field representatives as a reference during the field work. One, the Training Manual, should describe the study and give precise step-by-step procedures to be followed at each site, including precise information on where to locate certain student data on the campus, how to record student file data, editing requirements, travel logistics, and administrative details. With certain modifications the manual used by Advanced Technology during Stage One could be revised for future Pell Grant error assessments.

The second manual to be developed prior to the training program, the Question-by-Question Specifications, should include a

replication of each data collection instrument with specific information next to each item or question. This information should include but not be limited to the following:

- Explanation of the purpose and intent of each item
- Instruction for coding dollar and other values
- Explanation for completing items and sections that may be confusing, complex, or potentially error prone
- Warning about skip patterns
- Explanation for when to probe and ask for additional information during an interview

The Question-by-Question Specifications, in addition to being a training tool, is meant to be used as a guide when interviewing or collecting data from student files. The Question-by-Question Specifications manual used by Advanced Technology during Stage One could be revised and reused in a future error study.

2. Contact Institutions to Arrange Field Practice

Telephone institutions local to the training site and seek permission to conduct field practice on the next to last day of the training session (see step 4). Explain the purpose of the exercise to the financial aid administrator, the amount of time required for a practice interview (about one hour), and the amount of time to be spent collecting data from files (one to two hours is sufficient). Also, request photocopies of three or four financial aid files from one of the institutions. Ask that the institution delete all personal identifiers from the files. Those files are used during the training sessions for practice exercises in reviewing and abstracting data (see step 4).

TRAINING PROGRAM

BEOG QUALITY CONTROL STUDY

Monday, March 23

AGENDA

8:15 - 8:30	Coffee and Danish
8:30 - 9:20	General Welcome, Introductions, and Overview of Training Week - Mr. Joe Gertig and Ms. Melanie Allman, Advanced Technology
9:20 - 9:25	Introduction to Advanced Technology - Mr. Robert Darby, Advanced Technology
9:25 - 9:40	Introduction and Background of BEOG Quality Control Study - Mr. Ernst Becker, Department of Education
9:40 - 9:55	Quick Update on BEOG and Campus-Based Programs; Evolution of the Quality Control Data Collection Instruments - Dr. Alex Ratnofsky, Advanced Technology
9:55 - 10:15	Explanation of Data Collectors' Tasks and Responsibilities - Mr. Joe Gertig, Advanced Technology
10:15 - 10:30	Break
10:30 - 12:15	Film: Introduction to Interviewing; Conducting the Institutional Interview With the FAO - Dr. Jill Bernstein, Advanced Technology
12:15 - 1:00	Lunch
1:00 - 1:15	Review of Training Manuals - Melanie Allman
1:15 - 2:30	Detailed Item-by-Item Examination of Institutional Interview Form - Melanie Allman
2:30 - 3:30	Demonstration of Institutional Interveiw - Jill Bernstein and Melanie Allman
3:30 - 3:45	Break
3:45 - 5:00	Review Answers from Demonstration Interview; Group Practice: Beginning the Interview, Answering Respondent Questions, and Asking the Interview Questions - Jill Bernstein and Melanie Allman

FIGURE 4-3

TRAINING WEEK AGENDA FOR
STAGE ONE QC STUDY

Tuesday, March 24

8:15 - 8:30	Coffee and Danish
8:30 - 9:30	Role Playing of Institutional Interview with Trainees in Pairs
9:30 - 10:30	Acting Out of Institutional Interview: Trainers Playing Difficult Respondents with Trainees as Interviewers to Practice Probing and Handling Difficult Situations - Melanie Allman, Joe Gertig, and Dr. Bill Ade
10:30 - 10:45	Break
10:45 - 12:00	Detailed Item-by-Item Examination of Student Record Abstract and Specifics of Completing Abstracts - Melanie Allman
12:00 - 12:15	Completion of Business Forms and Associated Paperwork
12:15 - 1:00	Lunch
1:00 - 1:45	Distribution of Hypothetical Student Financial Aid Record File; Perusal of Sample Forms Likely to be Found in Student Aid Files; and Review of Federal Tax Forms - Melanie Allman
1:45 - 2:45	Practice Completing a Student Record Abstract Using Data From Hypothetical Student Files
2:45 - 3:00	Explanation of BEOG Alternate Disbursement System - Mr. Roy Watson, Advanced Technology
3:00 - 3:15	Break
3:15 - 4:15	Practice Completing a Second Student Record Abstract
4:15 - 5:00	Recap of First Two Days of Training
	Evening Assignment: Student Record Abstract (Practice Three)

FIGURE 4-3 (cont'd)

TRAINING WEEK AGENDA FOR
STAGE ONE QC STUDY

Wednesday, March 25

8:15 - 8:30	Coffee and Danish
8:30 - 9:15	Review of Answers for Tuesday Evening Assignment - Melanie Allman
9:15 - 10:15	Role Playing of Second Institutional Interview in Pairs
10:15 - 10:30	Discussion and Practice with Corrections Control Group Forms - Melanie Allman
10:30 - 10:45	Break
10:45 - 11:30	Role Playing of Resolution/Exit Interview with FAO - Melanie Allman and Bill Ade
11:30 - 12:15	Issuing of Cash Advances; Trip to Bank - Joe Gertig
12:15 - 1:00	Lunch
1:00 - 2:00	Explanation of Shipping and Receiving of Data Collection Materials, Editing, and Post-Interview Procedures - Bill Ade
2:00 - 2:30	Presentation by Data Analysts Explaining What Happens to Completed Data Collection Forms Upon Return to Project Office: Log-in of Forms, Interview Verification, Coding, Keypunching, and Data Processing - Bill Ade, Jill Bernstein, and Jennifer Zimmerman
2:30 - 3:30	Explanation of Travel Arangements--Cash Advances, Hotel Reservations, Airline Tickets, Car Rental Rental Procedures and Expense Reports; Discussion of Anticipated Problems - Joe Gertig and Bill Ade
3:30 - 3:45	Break
3:45 - 4:00	Explanation of Thursday, March 26, Field Practice - Melanie Allman
4:00 - 5:00	Practice Completing a Fourth Student Record Abstract

FIGURE 4-3 (cont'd)

TRAINING WEEK AGENDA FOR
STAGE ONE QC STUDY
4-63

Thursday, March 26

All Day	Field Practice at the Following Area Institutions:
	Trinity College Washington, D.C.
	Goucher College Towson, MD
	St. John's College Annapolis, MD
	Dundalk Community College Dundalk, MD
	Frederick Community College Frederick, MD
	Shenandoah College and Conservatory of Music Winchester, VA
	Capitol Institute of Technology Kensington, MD

FIGURE 4-3 (cont'd)

TRAINING WEEK AGENDA FOR
STAGE ONE QC STUDY

Friday, March 27*

8:15 - 8:30	Coffee and Danish
8:30 - 9:00	Photo I.D.s Taken
9:00 - 10:00	Detailed Review of Previous Day Field Practice-- Discussions of Experiences, Answers to Trainee Questions, Advice on How to Handle Problem Situations
10:00 - 10:15	Summary - Dr. Ted Bartell
10:15 - 11:00	Tour of SSOC; Confirmation Calls Made to First Week Institutions
11:00 - 1:00	Lunch Hotel Checkout
1:00 - 2:00	Recap of Training Week; Completion of Paperwork; Answering of Questions

* Friday training will be held at the Westpark Hotel

FIGURE 4-3 (cont'd)

TRAINING WEEK AGENDA FOR
STAGE ONE QC STUDY
4-65

Practice site visits can be arranged at the same time institutions in the regular sample are being contacted (see Task 4.2).

3. Mail Training Manual to Field Representatives

Once hired, field representatives should be notified as to the time and location of the training session. Also, mail the Training Manual to each representative with instructions to review it before the first day of training. Those who study the manual will begin the formal training session with a basic understanding of the goals of the study of interviewing techniques, and of the use of the data collection instruments.

4. Conduct Training Session

The agenda for the five day training session conducted by Advanced Technology during Stage One is shown in Figure 4-3. This agenda proved to be effective, and it is recommended that it be used as a guideline for planning future sessions. There are five basic training techniques that should be used during the training session: interactive lecture, film presentation, role playing, exercises, and field practice. The following describes each of these techniques and gives examples of the material that can be presented with each technique.

Interactive Lecture. This technique is typically used for explaining the purpose of the study, reviewing pertinent student aid regulations and procedures, explaining of basic interviewing techniques, describing the field procedures and other administrative details, and presenting the basic concepts of the data collection instruments. Also, the lecturer should lead the trainees through the questionnaire by calling on trainees to act the role

of interviewer while the lecturer plays the financial aid officer or some other institutional administrator. Each trainee records the responses in his or her blank copy of the questionnaire while a member of the training staff records responses on a transparency projected on a screen at the front of the training room. Trainees are reminded after each question to check their recording against the screen.

Film Presentation. For the Stage One training session, Advanced Technology showed a film on general interviewing techniques which covered such topics as gaining cooperation, maintaining rapport, asking questions, and probing responses. Film presentations are particularly helpful since they capture and hold the attention of the trainee better than a lecture does.

Role Playing. Once the lecturer has explained each item on the questionnaire, it is important that each trainee gain practice conducting mock interviews. The trainees break up into pairs. Within each pair, one trainee takes the role of interviewer while the other plays a financial aid officer who responds to the questions using a prepared script. Trainees playing the respondent role are cautioned not to coach the ones playing interviewer, but, as much as possible, to create a true interviewing situation. Each pair should conduct at least three mock interviews with the script for the initial interview being relatively straightforward and the scripts for the last two containing difficult responses.

Exercises. The trainees should gain substantial experience in reviewing hypothetical student aid files and recording data in

the Student Record Abstract during the training session. Sample financial aid files are compiled prior to the first day of the training session (step 2). During the actual sessions or as an overnight assignment, the trainees complete the sample record abstracts. The completed abstracts are reviewed individually by the trainees, and any problems or major errors are discussed with the group.

Field Practice. One day of the training session should be allocated to field practice at a local institution. The trainees should be divided into groups with a maximum of three to a group. Each group should be accompanied by a training supervisor. The practice site visit is basically an enactment of a typical full day in the field. It includes an introduction to the study, an interview of the financial aid officer, a review of student files, a review with the financial aid officer of apparent errors found in the files, and a field edit of the data collection instruments. The following day, the training group discusses their experiences, and the trainees answer any questions raised. Based on the field practice, the supervisors evaluate each trainee's preparedness for entering the field and hold special conferences for any in whom knowledge gaps or special problems are detected.

Task 4.5: Conduct Site Visits

Fourteen separate activities must be completed for each site visit, as shown in Figure 4-4. Resolution of discrepancies, a fifteenth activity, will be required at many institutions. Depending on the sampling procedure used, the number of records

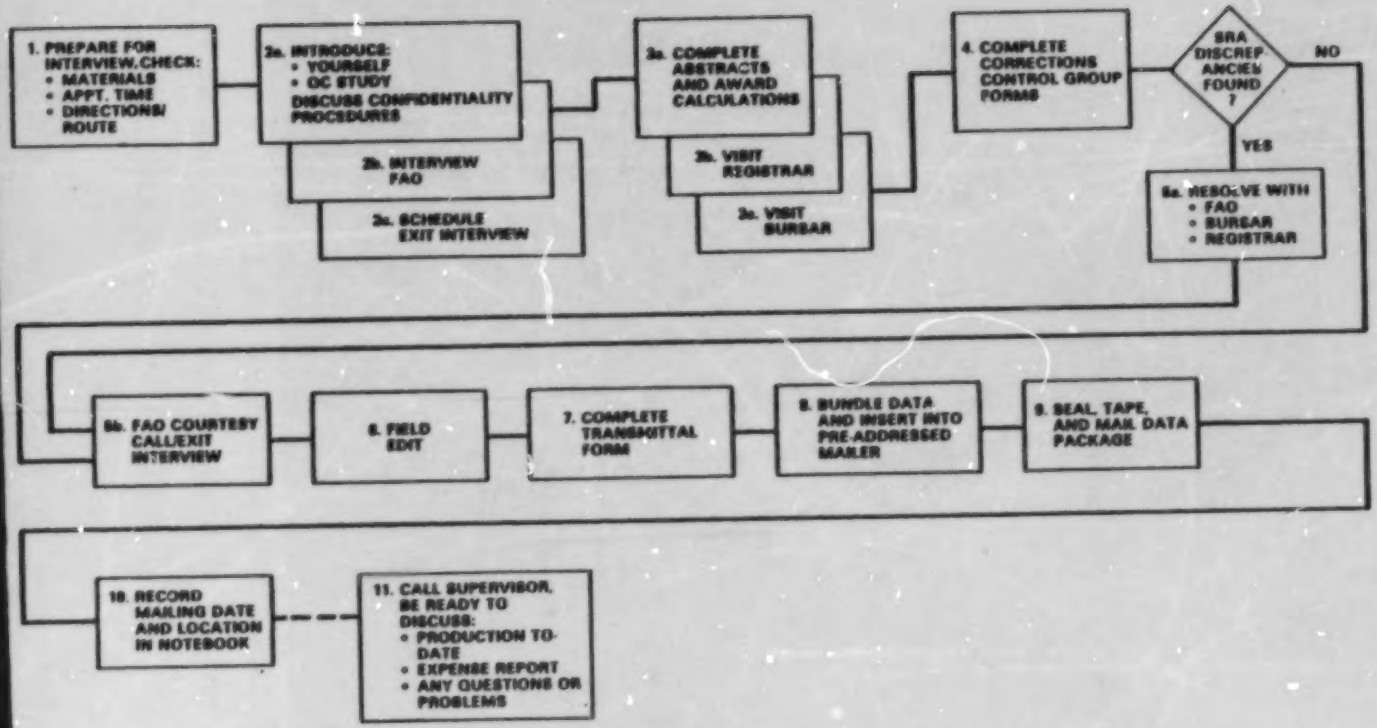

FIGURE 4-4

INSTITUTIONAL DATA COLLECTION CYCLE

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to be reviewed per institution may vary considerably, consequently, the scale of the visit may vary from less than a day to seven days at any one institution. Recordkeeping systems at institutions also vary, and these, too, will affect the length and complexity of the visit. Nevertheless, each of the steps in Figure 4-4 must be carried out to some extent at every institution.

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Procedures

1. Prepare for the Site Visit

The site visitor should call the financial aid office at least two days (but no more than a week) in advance to confirm the appointment, travel directions, and parking and check-in procedures. On occasion, site visitors may fall behind schedule and have to reschedule a visit. Rescheduling should only be done by field personnel if it will not affect other institutions later in their schedules. Otherwise, rescheduling should be done by central project staff.

Before arriving at the site, the data collector must check to be sure to have all the necessary forms and materials for the visit.

2. Meet with Financial Aid Director

The meeting with the financial aid director includes three activities: introducing the study, conducting the interview, and scheduling the exit interview.

2a. Introduce the Study. The data collector should present his credentials and describe the nature and purpose of the study, particularly the site visit component. Although the visit will

have been preceded by letters and telephone calls, many financial aid directors will have only a vague idea of the study prior to the visit. The data collector should also describe for the financial aid director the steps he will follow after the interview and the records he will need to review.

2b. Conduct the Interview. The interview should be conducted by following the formal questionnaire as closely as possible. During the training week, the field representatives are given extensive instruction in conducting the interview. They are told to observe the following basic guidelines when asking questions and recording responses:

- Remain neutral
- Ask all questions exactly as worded
- Discourage unrelated conversation
- Ask respondents to enlarge or clarify answers when necessary
- Record verbatim the respondent's questions

At some institutions, especially large ones, the financial aid director may prefer to have Pell Grant questions answered by a staff specialist in that program, either by having a joint interview or by referring the data collector to that person. In some cases, the director may not even be present, having left the entire visit in the hands of a subordinate because of scheduling problems. Someone other than the financial aid director can be interviewed so long as the substitute can give authoritative answers about institutional policy and practices. In previous field work, alternate interviewees have been scheduled for some

institutions during the telephoning required to draw up the master schedule. In some cases, no one on the financial aid staff may be able to answer some of the interview questions, and the bursar may have to be questioned about fiscal operations and refund and repayment policy, and the registrar on procedures used to check enrollment status.

2c. Schedule Exit Interview. Upon completion of the formal questionnaire, the visitor should arrange to meet with the financial aid director or someone on the staff to discuss any discrepancies found in the records of individual students. Also at this time, arrangements must be made for access to the student aid files. Especially at smaller institutions, the director may be uncomfortable with having an outsider reviewing files, and so may want to be present during the file review and pull the individual files personally. At larger schools, this function will usually be delegated to a subordinate professional or a secretary or clerk.

3. Complete File Abstracts

Assuming that the sample has already been drawn (in a previous visit or from lists furnished by the school before the visit), the site visitors can present a list of the students sampled at the institution and ask to see their financial aid files and SARs. The type of files available will vary tremendously. Small schools are more likely to have manual filing systems where all the records for each student are kept in a folder in alphabetical order. At such schools, the relevant

files can simply be pulled and reviewed; some institutions may even be willing just to show the visitor the file and let him pull the files himself. Many institutions have some or all of the relevant data in computer files. There, a staff member will have to show the site visitor how to access specific files and how to interpret the information which appears on a monitor; or, a staff member may have to request a printout of the relevant data for the sample students and then explain the printout format to the visitor after it is delivered.

Hard copies of SARs and required documentation should be available at all schools. However, these and other records may be most readily available on microform. These, too, will normally need some explanation from financial aid office personnel before they can be used by the site visitor.

Many financial aid offices will have disbursement records and documentation of enrollment status and satisfactory academic progress, or copies of the required records, in their student aid files. In other cases, these records may be part of the electronic file accessible on the terminals in the financial aid office. At some schools, however, disbursement records will be available only at the bursar's or treasurer's office or office of student accounts, and enrollment and academic progress records will be available only at the registrar's office. Although the telephone protocol used to schedule the visits should have included questions designed to determine whether all the records are in one place, the answers may be ambiguous or wrong. As soon

as the site visitor determines that some records are not in the financial aid office, he should ask for arrangements to be made to obtain access to the other offices, so they will have at least a couple hours' notice of his visit. Especially cooperative financial aid directors send memos to the bursar and registrar informing them of the date and legitimacy of the visit and of the possibility that their records may have to be consulted. At small institutions, the "director of financial aid" may be a vice-president with authority for student accounts and academic records as well as financial aid; once his cooperation with the study has been secured, the other offices pose no problem.

The field representative must place a notice in each reviewed file stating the purpose and the date of the data collection. This notice satisfies the conditions of the privacy regulations.

4. Complete Control Group Forms

While reviewing the student files to complete the SRAs, the field representative should record information from the SAR onto the Corrections Control Group (CCG) form.

5. Conduct Exit Interview

Before leaving a site, the field representative must conduct a brief exit interview with the financial aid officer, the purpose of which is to thank the aid officer for his or her cooperation, and to discuss discrepancies found in the student files to learn whether the aid officer can offer a logical explanation for what on the surface appears to be an error or violation of Pell

Grant regulations. The field representative must use tact in seeking this explanation, in order to reassure the financial aid officer, if necessary, that his or her response will be kept in confidence and used for national estimates only.

6. Edit Completed Instruments

At the end of each work day, the field representative must edit all completed instruments for possible omissions, inconsistencies, illegible handwriting, or misplaced codes. If the field representative is scheduled to return to the institution the following day, he or she can take advantage of this opportunity to clarify or retrieve any missing information. Otherwise, the field representatives do not recontact the institution to retrieve data. Instead, they write notes next to the items in question and, once the instrument has been received, senior staff members at the project office attempt to retrieve the incorrect or missing data by telephone (see Task 4.7: "Follow up by Telephone").

7. Complete Transmittal Form

The transmittal form lists all the student record abstracts, interview forms, and control group forms being sent to the project office. It is important to list everything being sent so that the receiving clerk can be sure that nothing was lost in the mail. It also gives the data collector an opportunity to make sure he is sending in all the required forms.

8. Bundle Data and Insert in Pre-Addressed Mailer

Pre-addressed, padded envelopes are provided to the data collectors to ensure that data are correctly addressed and protected during shipment.

9. Seal, Tape, and Mail Data Package

First class mail is used to transmit data because of the widespread availability of post office and drop boxes. Special services (registered mail, express mail, special delivery) do not add enough security or speed to the delivery to be worth the cost. In previous data collections, no data have been lost or inordinately delayed through the use of ordinary first class mail.

The field representative should mail completed instruments to the project office every two or three days. Waiting longer than three days increases the risk that instruments will be lost in the field. Instruments should be sent in heavy-duty envelopes accompanied by a transmittal form detailing the contents of the mailing.

10. Record Mailing Date and Location in Notebook

Recording the date and location of mailing provides a useful record in case of any disputes with either the Postal Service or the data collector about delay or loss of forms.

11. Call Supervisors

Data collectors should call the field supervisor once a week to discuss the progress of the data collection and any problems or questions encountered in the field. This call will also enable the supervisor to regularly discuss any procedural or coding

errors by the data collector, or any vague, undocumented, or unallowable field expenses. Critical problems should be resolved by an immediate phone call from either the supervisor or the data collector, and not left to the weekly call.

Task 4.6: Implement Quality Control and Supervision Plan

To ensure that the data collected for the error study are accurate, timely, and obtained at minimum cost, a supervision and quality control plan must be implemented at the start of the field period. Communication with the field representatives will take place through periodic memoranda and through scheduled weekly telephone calls from the field staff to the project office. In addition to quality control measures such as the field editing (discussed in Task 4.5) and the manual and machine editing conducted in the project office (discussed in Chapter 5), a sample of completed instruments must be randomly selected and validated by the project office staff to ensure the reliability of the collected data. In addition, field representatives should be monitored in person to ensure that they are following all procedures properly and recording the correct data.

Procedures

1. Send Periodic Memoranda

Send memoranda to the field representatives as often as necessary throughout the field period to communicate updates to existing procedures or implementation of new procedures.

2. Establish Telephone Schedules

A separate telephone line with an 800 number and a recording device should be installed in the project office. At least once

a week on a scheduled day and time the field representatives should be required to call the project office. These weekly calls can serve three purposes:

- Monitoring of Data Collection. During these calls a project staff member can answer questions on interviewing technique, instrument, administrative, coding convention, and so on.

- Changes in Interview, Travel, and Accommodation Arrangements. There may be unforeseen changes to the field representative's itinerary initiated by financial aid officers, hotels, or airlines. In all cases, the field representative should be required to report schedule changes to the project office. If the progress of a particular field representative lags due to unforeseen data collection or travel problems (e.g., sickness, bad weather), a project staff member can use the weekly telephone call to discuss ways of resolving the schedule problem with the field representative. Sites of field representatives whose progress is lagging can often be reassigned to others who are ahead of schedule.

- Clarification of Routine Business Matters. Issues related to expense reports, travel advances, paychecks, and so on can also be discussed during the weekly calls.

The field representatives should be encouraged to call the project office more frequently than the required weekly call. A recording device should be installed to take messages after business hours.

3. Validate the Field Representative's Work

During the field period, verify that the institutional site visits are being conducted according to correct procedures. Select one recipient at random from each institution in the sample. Telephone the financial aid administrator to confirm that the student records were, in fact, inspected, and that the conduct

of the field representative was appropriate. In addition, the financial aid officer should be asked to verify two questions from the Institutional Questionnaire (IQ) and one from the record abstract of the selected recipient. The items selected for validation should be those unlikely to have changed in fact or in the financial aid officer's perception between the time of the site visit and the validation call. For the Stage One study, Advanced Technology asked "What Types of Documentation of Income Are Routinely Collected by Your Financial Aid Office?" and "How Frequently Are Payments Disbursed to Eligible Recipients?" from the interview, and "What Is the Recipient's SAI?" from the record abstract. If a financial aid officer makes a negative evaluation or a discrepancy is found between the field representative's findings and the validator's findings, the field representative should be contacted immediately for an explanation.

4. Observe Field Representatives On-Site

Monitor each field representative on-site at least once during the field period. The monitoring visits should occur during the first two weeks so that any problems in field procedures can be found and corrected early. During the site visit, observe the field representative's interviewing technique, professional manner, thoroughness, and accuracy. Review several completed file reviews thoroughly. Discuss any problems found.

Task 4.7: Follow up by Telephone

Field representatives may send instruments to the project office with critical items left blank or with data that are

inconsistent or illogical. Missing and inadequate data can be collected efficiently at low cost by telephoning the field representative or the institution. Experience suggests that, although extremely important, this is not a time-consuming task. In Stage One, only 5 institutions out of a total sample of 305 were contacted to retrieve data.

Procedures

1. Telephone Field Representative or Institution

Once the missing or inadequate data are found (usually during the manual or machine editing stages), call the field representative or institution.

2. Code Instrument

Code the instrument based on the new data collected in the telephone conversation.

Task 4.8: Debrief Field Representatives

Data collection for the institutional component of the error study should not end with the last site visit. The field representatives, particularly if they are financial aid professionals, will have many observations and recommendations regarding error in the Pell Grant program.

Procedures

1. Plan One-Day Debriefing Session

Develop an agenda for a one-day panel discussion among field representatives and project analysts. The debriefing agenda used by Advanced Technology during Stage One is shown in Figure 4-5.

2. Conduct Debriefing Session

During the day-long session, discuss significant problems with the Pell Grant delivery system and quality control procedures being used at institutions. Also, discuss ways in which the institutional data collection could be improved for the next study.

CHAPTER 5

DATA PREPARATION SPECIFICATIONS

OVERVIEW

The purpose of the data preparation system is to compile, verify, convert, and organize raw survey data onto a computerized data base for analysis. The major objectives of the system are to:

- Ensure the timely and efficient processing of the incoming raw data
- Ensure the completeness and accuracy of the survey data
- Maintain control of the status of all data collection instruments to prevent them from being lost or misplaced
- Ensure the transcription accuracy of coders and data entry staff
- Maintain the confidentiality of the data
- Ensure that "cleaned" data files are successfully merged to form a single file of "best verified" data

Technical specifications for meeting these objectives are set forth in this chapter task by task and step by step. As in Chapter 4, the descriptions of each task follow a set format: first, a discussion of the purpose of the task and any important issues that need consideration and, second, a step-by-step list of procedures. Figure 5-1 presents an overview of the tasks and procedures described in this chapter.

In general, the procedures set forth in this chapter apply regardless of the type of data collection instrument or hard copy form that will be processed. For example, 30 page interview questionnaires with many open-ended questions must be scanned,

coded, edited and keyed, in the same basic way as 2-page 1040 tax returns.

Schedule Considerations

Data preparation should begin once the data start arriving from the field rather than after a complete set of data has been collected, for two reasons. First, analysis of findings can begin and be completed much sooner than otherwise. Second, telephone follow-up of respondents or interviewers who have sent incomplete or inadequate data to the home office is more successful the closer it is conducted to the time of the interview or the data collection. For example, if data preparation is done on a continuous and efficient basis, an important omission on a questionnaire sent by a field interviewer can be discovered within a week after the interview. When contacted, that interviewer will likely remember the interview and will be able to provide the information over the telephone. If not, the interviewer might still be in the vicinity where the interview was conducted and will be able to recontact the respondent.

Security and Confidentiality

The organization responsible for conducting an annual assessment of Pell Grant error must be firmly committed to protecting the confidentiality and privacy of individual data collected from students and parents. All data preparation activities should be conducted in accordance with the spirit and letter of the Buckley Amendment and the Privacy Act of 1974. The

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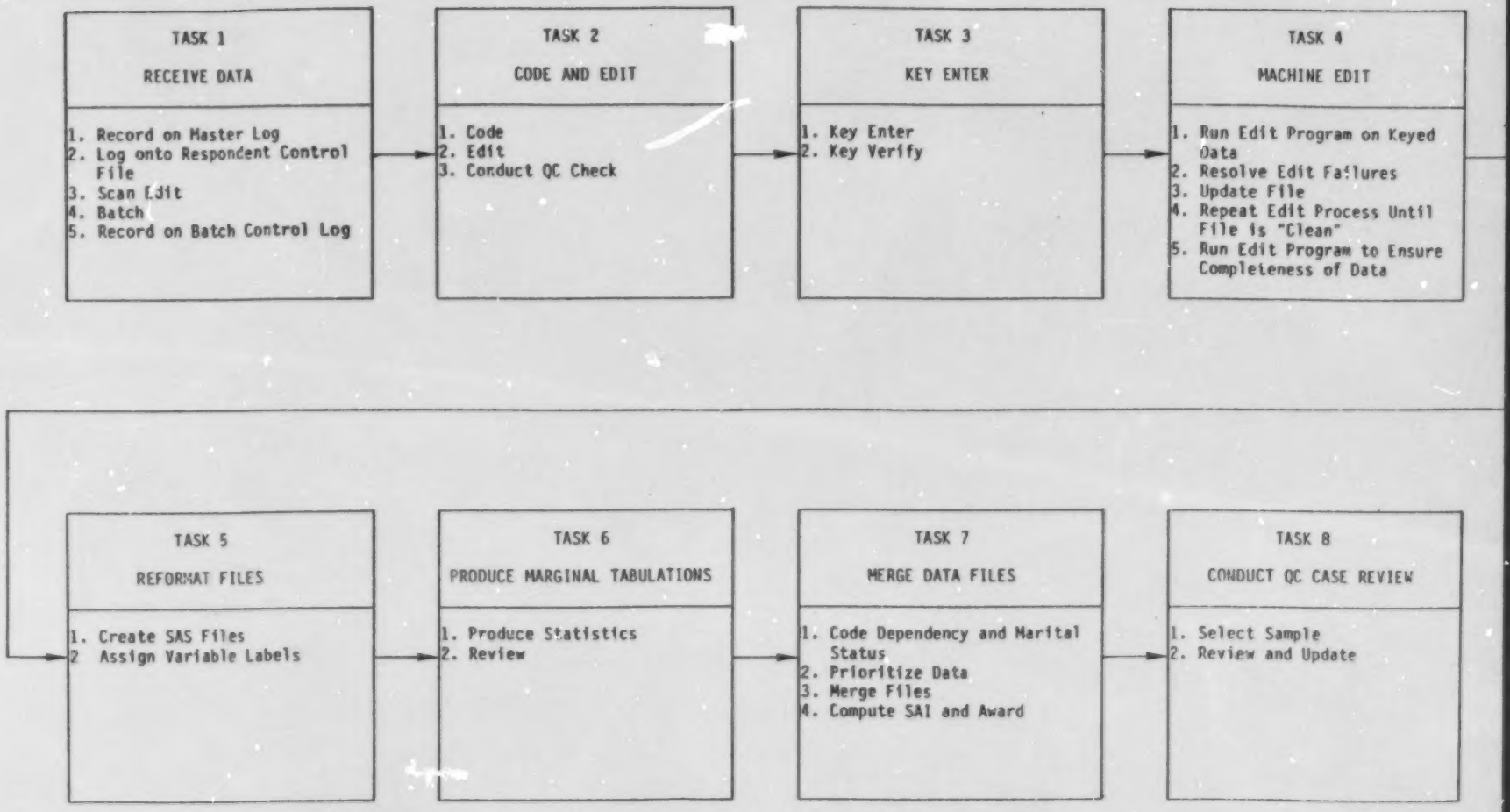

FIGURE 5-1

SUMMARY CHART OF MAJOR
DATA PREPARATION STEPS

following steps should be taken to safeguard the security and confidentiality of the data:

- Receipt control, coding, editing, and keying operations should all be conducted in lockable rooms accessible only to project staff. Cleaning personnel should only be allowed to enter the rooms when one of the project staff is also there.
- Data collection instruments must be maintained in lockable file cabinets in these rooms.
- All staff members who handle individual respondent data should sign a confidentiality pledge.
- All the necessary documentation of computer files should be kept in a file accessible only by authorized project staff analysts.
- If any computer file needs to be processed outside the home office, no personal identification should appear on a respondent data record. Instead a system of files should be formed with File 1 containing personal identification (name, address, and telephone number) for each sampled recipient, File 2 containing the responses for each participant, and File 3 containing information which links File 1 to File 2. In such a system there can be no link between respondent data and personal information without the presence of File 3.

TASK 1: RECEIVE DATA

Central to the data preparation effort, particularly when a large number of data collection instruments is involved, is a well-defined system to be used by home office staff in the receipt, logging, and routing of all instruments. Procedures must be instituted to maintain control of the status of each instrument from the time received at the home office to the time the data are entered onto a computer data base.

It is highly recommended that the receipt system make use of a computerized file of respondents, particularly when the sample is large and the data collection requires a telephone follow-up

of nonrespondents. The respondent file, created during the sampling stage, should include at a minimum the names, addresses, and Social Security numbers of sampled students and parents and the names and addresses of sampled institutions. The file can be used to:

- Generate a log for cataloging data instruments as they are returned from the field
- Produce up-to-date reports on the progress of the data collection and data preparation efforts
- Identify nonrespondents

Procedures

1. Record on Master Control Log

As instruments arrive in the home office, a log-in clerk should record the date received and his or her initials on the master control log. This log, generated from the computerized respondent file, should include the name and address of each respondent in study identifier order. Space should be provided on the log for updated information on names and addresses. Figure 5-2 shows the log used by Westat during the Stage One study. The master control log's usefulness is demonstrated when someone wants to know a certain instrument's whereabouts. To get this information, simply look up that instrument's identifier in the master control log: absence of any entries indicates the instrument has not been received.

2. Log onto Respondent Control File

Once instruments have been recorded on the master control log, the clerk should enter the fact that the instrument was received and any address updates onto the control file. In the

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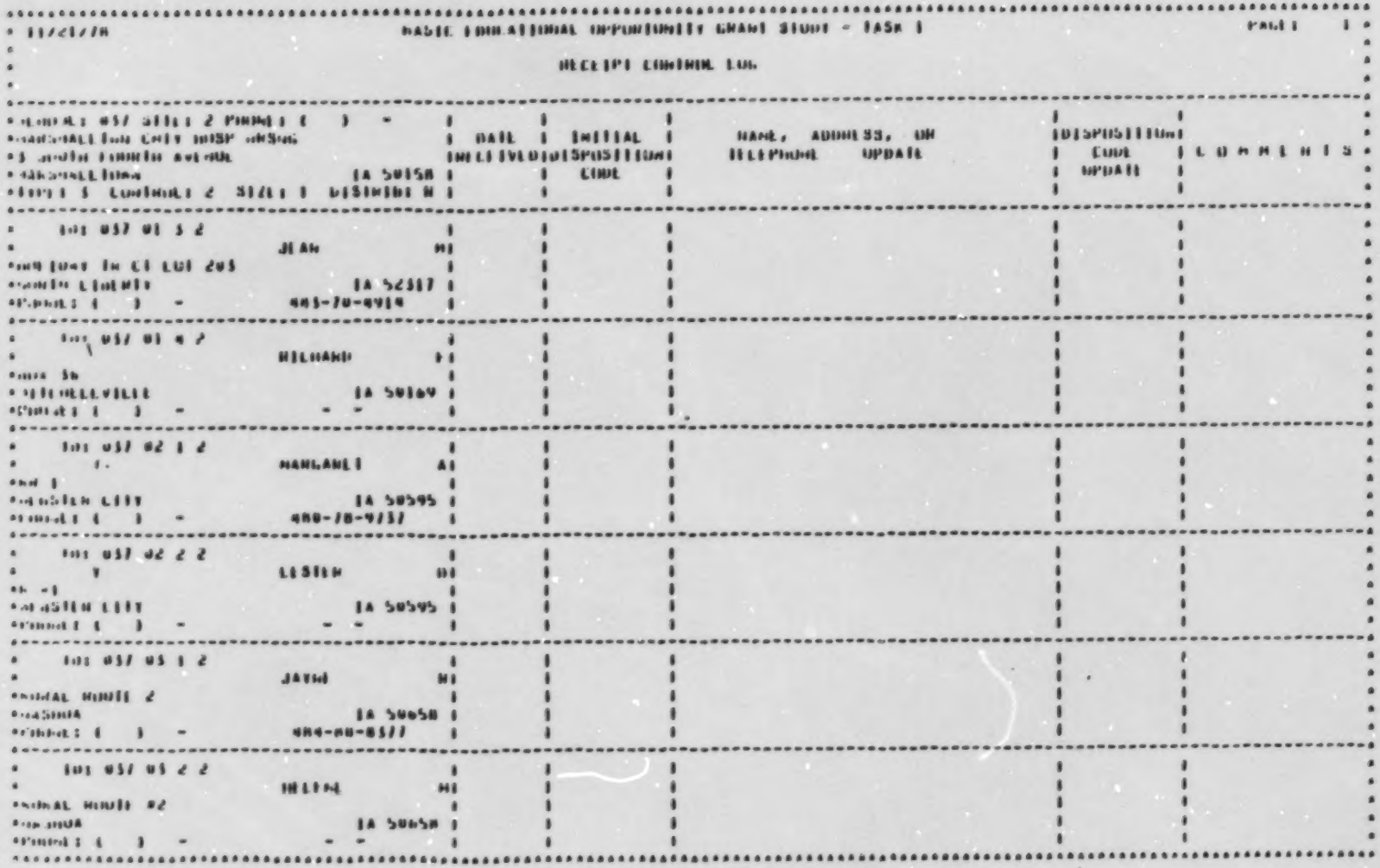

RECEIPT CONTROL LOG

DATE RECEIVED	INITIAL DISPOSITION CODE	NAME, ADDRESS, OR TELEPHONE UPDATE	DISPOSITION CODE UPDATE	COMMENTS
		JEAN HI		
		IA 52317		
		481-78-4919		
		RILEHARD PI		
		IA 50169		
		- -		
		HANLANLI AI		
		IA 50595		
		480-78-9737		
		LESIEH DI		
		IA 50595		
		- -		
		JAYNI HI		
		IA 50658		
		484-88-8577		
		HELENE HI		
		IA 50658		
		- -		

FIGURE 5-2

MASTER CONTROL LOG USED
DURING STAGE ONE QC STUDY

Stage One study, Westat used an optical character recognition (OCR) Wand Reader which scanned each instrument and transferred information to the control file. A card update approach can be used, although it is more time consuming and less efficient.

3. Scan Edit

After logging in, the clerk must review the instrument to determine if it is sufficiently complete to continue to be processed. The instrument should be considered incomplete if more than 10 percent of the questions or items are blank or if any critical piece of information was not provided. In the Stage One study critical items were those items needed to calculate total error, institutional error, total student error, and application item error. Incomplete instruments should be set aside for telephone follow-up (see Chapter 4); complete instruments should continue to be processed.

4. Batch

The clerk should then batch instruments into groups of manageable size (normally 10-50 instruments per batch) and attach a transmittal sheet identifying the contents of the batch. The batch should be given an identifying number. Batching facilitates the handling of a large number of instruments and minimizes the risk of losing and misplacing instruments.

5. Record on Master Control Log and Batch Control Log

Once a batch has been formed, the clerk should record its I.D. for each of its instruments on the master control log and then make an initial entry in a batch control log. A batch control log, an example of which is shown in Figure 5-3, should

FIGURE 5-3

BATCH CONTROL LOG USED
DURING STAGE ONE QC STUDY

Circle One:
SRA CCG

Institutional ID	Coder Assigned	Package # By Date Assigned and # of Instruments						Total # of Instruments	Date Coding Complete	% Verified	Date To Keypunch	Keying Batch #	Date Returned
		1	2	3	4	5	6						

be used to trace the path of each batch of instruments through all processing steps. A batch's line entry should be initialed when the batch is formed and then updated (initials, dates, remarks) as the batch enters or exits a processing step.

Using the master control log and the batch control log, the exact status and location of an individual instrument can be found as follows:

- Locate the instrument's I.D. number in the master control log. Find the number of the batch containing the instrument.
- Locate the batch number in the batch control log. Determine the physical location of the batch.

TASK 2: EDIT AND CODE

Once the data collection instruments have been received and logged in, they must be thoroughly reviewed for completeness and accuracy and their responses must be translated into numerical codes. In reviewing and coding the instruments, the coding staff can make decisions that have a substantial impact on the analytical findings. Therefore, it is very important that:

- A detailed, easy-to-use, coding and editing specifications manual is developed to guide coders, to act as a reference for programmers and analysts, and to provide documentation of the data files.
- Coders are thoroughly trained

The coding and editing specifications manual must contain the following:

- Codes for all possible responses, including codes for missing data such as "response not ascertained," "inapplicable" (legitimately skipped), and "don't know"
- General editing instructions including the logical range of values precoded by the interviewers or respondent

- Clear delineation of skip patterns
- Variable names for all items to be coded/edited

The text of the manual should be kept on a word processing system so that new codes can be quickly added. Figure 5-4, a selected page from the student interview manual used by Westat during Stage One, shows an exemplary format for a coding and editing specifications manual. Westat's and Advanced Technology's Stage One manuals could easily be modified for an ongoing annual assessment of Pell Grant error once a decision is made on the data that will be collected.

The coding staff must be thoroughly trained in the use of the manual, the general data preparation procedures, and the regulations and procedures of the Pell Grant program. One day is normally a sufficient amount of time for training. The training session should include both an item-by-item explanation of coding/editing specifications with attention paid to potentially error-prone areas and the coding of several practice cases containing specially selected response patterns. These practice cases should be carefully reviewed by a senior staff member. Coders with unacceptable practice performance should be given additional training.

Procedures

1. Code

Assign coders work by coding batch, and require them to complete the coding of one batch before beginning work on another. When a coder receives a batch, the batch's assignment must be noted in the batch control log.

Question Number	Column Number	
Q63C	48-49	(PROBE): How did you figure out the answer to this question?
		↔ = Inapplicable, coded 2, 8 or 9 in Q62, Col. 37, Card 08; or coded ↔, 01-04, 10-16, 96, 98 or 99 in Q63B, Cols. 46-47, Card 08
		01 = Remembered/knew (respondent or other family member)
		02 = Estimated/guessed
		04 = Consulted professional
		98 = DK
		99 = Not ascertained
Q64	50-55	What was the total amount of (your spouse's or) your (or your share of) mortgages or related debts for which your business(es) (was/were) used as collateral?
		↔↔↔↔↔↔ = Inapplicable, coded 2, 8 or 9 in Q62, Col. 37, Card 08
		000001-100000 = Actual dollar amount
		999997 = None
		999998 = DK
		999999 = Not ascertained
Q64A	56-57	Please show me the (document/paper) you have to (verify/prove) this.
		↔ = Inapplicable, coded 2, 8 or 9 in Q62, Col. 37, Card 08; or coded ↔↔↔↔↔↔, 999998 or 999999 in Q64, Cols. 50-55, Card 08
		01 = Copy of mortgage statement
		02 = Copy of statements of loans against business
		11 = Respondent's personal ledger/records
		12 = 1120 tax form
		13 = 1040 tax form
		96 = Left it blank
		97 = No documentation
		98 = DK
		99 = Not ascertained

Code ↔'s in Q64A, Cols. 56-57, Card 08

FIGURE 5-4

SELECTED PAGE FROM CODING MANUAL
USED DURING STAGE ONE QC STUDY

Due to questions in the data collection instruments which are open-ended in format, coders will often not be able to code responses with any of the predetermined list of codes in the editing and coding specifications manual. In such cases, the coder must record the response and forward it to a senior staff member designated as the coding supervisor who, if necessary, constructs a new code. Coding decisions must remain consistent. Therefore, the coding supervisor should serve as the focal point of all decisions. It is important that all decisions be recorded on a log, an example of which is shown in Figure 5-5. A decision log can aid the coding supervisor in making consistent decisions throughout the coding process. It also can provide information to revise the data collection instruments and the coding and editing specifications manual for the next data collection effort. At least once a day, the coding staff should be informed of all coding decisions; coders should then be responsible for updating their manuals.

2. Edit

All instruments during coding must be reviewed for completeness and accuracy. Coders should check skip patterns to see that they are followed correctly, check responses for legibility and relevance, and check the consistency and logic of all data. Although coders scan all items on the instruments, certain questions that are found to be error-prone should be given particular attention. When coders find erroneous skips, illegible answers, or illogical responses, they should document the problem and refer the case to the coding supervisor.

PROBLEM SHEET

ID Number: _____

Package Number: _____

Question: _____

Column(s): _____

Coder: _____

Circle One:

SRA CCG IQ

Problem: _____

_____

_____

_____

_____

Solution: _____

_____

_____

_____

FIGURE 5-5

CODING DECISION LOG
USED DURING STAGE ONE QC STUDY

Often missing, incorrect, or illegible data can be reconstructed on the basis of responses to associated questions or notes by the respondent or interviewer in the margins of the instrument form. If data which are critical for measuring error cannot be reconstructed, the instrument should be set aside for telephone follow-up (see Chapter 4).

3. Conduct Quality Control Check

High performance standards must be maintained for all coders through sampled inspection of each coder's work. At the beginning of the process, the coding supervisor should inspect all instruments in each coder's completed batch. Once a coder attains an error level below .1 percent (for example, one error every 10 100-item instruments), verification can be cut back and performed on no more than 10 percent of the coder's subsequent work. Verification sheets showing number and types of errors should be maintained by the coding supervisor and copies distributed to the coders. Whenever a coder's error rate exceeds the .1 percent standard, or a pattern of errors appears, verification of that coder's work should be increased, and feedback or retraining on specific procedures given.

TASK 3: KEY ENTER

Westat's and Advanced Technology's experience in entering large volumes of data has proven batch entry to be more economical, efficient, and effective than on-line entry. Data may be entered from key to card, key to disk, key to disk to tape, or key to tape. The data processing environment of the organization

which conducts the annual error assessment (ED or contractor) will dictate which data entry approach is most advantageous.

The data entry staff must be provided with keying instructions which include the record (card) layouts for each data collection instrument, the data field locations, the allowable content for each data field (alphabetic, numeric, zero fill, and skips), and valid field ranges.

The data entry machinery must allow for simple editing of data items to ensure keypunching accuracy. These edits should perform alphabetic and numeric field checks and field range checks. The key entry system should also have the capability of generating reports for the data entry manager and detailing production and error rates accumulated by each key entry operator. This report will allow the manager to screen for systematic errors and to control tightly the quality of all data keyed into the system.

Procedures

1. Key Enter

Keying should be performed in batches, transferring data directly from instruments to cards, disk, or tape. Once a keying operator receives a batch, the assignment should be recorded in the batch control log. Keypunch errors caught by the key entry edits must be corrected immediately by the keypunchers.

2. Key Verify

Each batch of keyed data must be 100 percent key verified against the associated instruments by an operator other than the one who originally keyed in the data. The data entry manager

should maintain a record of errors for each keying operator. If an operator's error rate exceeds an unacceptable level, the manager should give feedback or retraining.

TASK 4: MACHINE EDIT AND UPDATE

When the data are returned from keypunching they must be processed through editing software to verify their correctness and completeness. The editing system performs range checks on individual items and cross checks on related items to ensure that all fields contain data within valid ranges and consistent across data fields.

All editing software should be developed and in place by the time the first data are returned from keypunching. The programmers designing the software must have some input into the forms design stage of the task so that the best possible record layouts can be designed. The programmers should also be present when coding conventions are established in order to guarantee that the coding methods chosen do not prevent efficient editing. After coding conventions are established, all the software can be designed and tested. The major portion of the editing should be done by a COBOL program designed to edit 80 byte records according to specifications provided to it through a group of parameter cards. These parameter cards must be written for each type of data to be edited, e.g., parent, student or institution data, and must specify range checks and cross-field checks to be performed on data items.

Editing software must be changed each time a new code is established by the coding supervisor. It should be the responsibility of the coding supervisor to keep the programmers informed of all code changes as soon as they are established.

Data that include multiple records per case require additional editing to verify that all data are present in complete sets. A short EASYTRIEVE set check program will accomplish this. This program can be written at any point after the forms design stage.

Procedures

Note that all editing software described here has been developed by Advanced Technology. With certain modifications and enhancements, the COBOL and EASYTRIEVE existing programs could be reused for subsequent error studies.

1. Run Edit Program on Keyed Data

The data should be forwarded in batches from the key entry site with documentation identifying the type of data and the number of cases or records contained in each batch. The data should be used as they are batched unless batches contain a small number of records (e.g., less than 200) in which case several batches of the same type data will be combined and run together.

Input data into an IBM sort program and sort first by I.D. and second by card number. This is the order in which the tape will be processed throughout the editing cycle and it is also the order of the final tape. The output to the sort will be a sorted tape.

Input the sorted tape into the appropriate COBOL editor program. The invalid data will be written to disk and to the printer. The valid data will be written to tape. The printed output will identify each error by field name and print the entire data record. Control totals will also be output and must be checked to ensure that all data records have been processed and are accounted for on either the valid or invalid data files.

2. Resolve Edit Failures

Pass the printed output to the coders to be reviewed and corrected. Coders must locate the original instrument for each record in error and make corrections on the printed output. If the error cannot be corrected by reviewing the instrument, the form must be forwarded for telephone follow-up. If the correct value for the data item in error cannot be obtained, the coders should designate it as missing data. When all errors for one batch are resolved the printed output must be returned so that the file can be updated.

3. Update File

Review the corrected output to ensure that all errors have been resolved and will not be rejected again by the COBOL editor. Corrections must then be made to the error records on the disk file. This can be done on the CRT by data entry staff.

4. Repeat Edit Process Until File Is "Clean"

Input the corrected disk file into the COBOL editor. If any errors are found in this run, the correction process must be repeated until there is no invalid data found by the COBOL editor.

When the data from the batch are error free they will be located on several different tapes. These tapes must be merged together. Since all tapes are sorted in the same order, they can be merged by using an IBM merge. The output of this merge will be one tape with all the clean data from one batch. All intermediate tapes and disks should be purged at this point.

5. Run Edit Program to Ensure Completeness of Data

Input all "clean" data tapes that contain multiple records per case into the EASYTRIEVE set check program. This program will output a printed list of all data records that are part of incomplete sets of data. These errors must be resolved in the same way as the errors from the COBOL editor. To correct set check errors, an EASYTRIEVE program must be written and executed. The output will be a tape containing the final cleaned and complete data for the batch. This tape should be run through the set check program again to verify its correctness.

Store the final tape from each batch until it is needed for analysis or until all batches of data for one type of data are clean.

TASK 5: REFORMAT FILES FOR ANALYSIS PACKAGE

The particular analysis package to be used in the study will determine what type of data file is necessary. Past experience suggests that the Statistical Analysis System (SAS) is the most efficient and flexible software program for this type of study. SAS, for example, is considerably more flexible than other programs for merging records which contain varying types and amounts of information into a single data base.

The data at this point are stored on IBM operating system (OS) files. For use in SAS it should be reformatted into a SAS file. Although the data can be read directly from the OS files, reformatting the files allows variable names, variable labels describing their purpose, and value codes for categorical variables, to be stored on the file itself. Since a great number of variables are needed in the study, reformatting the data will prevent confusing data items and names.

Procedures

1. Create SAS File

Create a separate SAS file for each data source, (e.g., IRS, parent interview, student interview), using a SAS program. The data items for each file will be contained on one or more records (cards), each of which includes a common variable--either student I.D. or institution I.D. Read each record into a separate output file and assign variable names to each item. Sort the output files by the common variable and merge them to form a single file. Because of the number of variables involved, the names used should follow the convention of a three-letter code signifying the source followed by a two- or three-digit number assigned sequentially. For example, variables in the parent interview file could be named PAR001, PAR002, PAR003, etc.

Translate missing value codes, i.e., codes for "not applicable," "no answer," and "don't know," into a single missing code in the merged file.

2. Assign Variable Labels

Next assign labels to each variable describing the purpose of that data item. Labels are used in later analysis procedures to produce more readable output. The institution interview file may contain many categorical variables with multivalued codes. These values should be recorded and labeled in the file as well.

TASK 6: PRODUCE MARGINAL TABULATIONS

After the reformatting of the data is complete, the data should be checked again to see that the reformat programs ran successfully. If the reformatting programs are done in SAS, it is a simple matter to produce marginal tabulations and simple statistics as a part of these programs. The tabulations may then be used to check the accuracy and completeness of the data. These tabulations provide the analysts with an overall look at the range and distribution of the data. In addition, they may serve as diagnostic tools when problems or questions turn up later in the data merge or analysis.

Procedures

1. Produce Statistics

At the end of each reformatting program, run a procedure to determine the frequency of each value in categorical data, (e.g., PROC FREQ in SAS). The distribution of continuous variables, including the means, extremes, and quantities, should be found using another analysis procedure (e.g., PROC UNIVARIATE in SAS). Produce cross-tabulations with related categorical variables.

Run at least one of these procedures on every variable. Frequencies should also be run on ranges of values of continuous variables, but some care should be exercised as frequencies run on continuous variables and univariates run on categorical variables will produce great quantities of meaningless output. Finally, print a number of cases to provide a general check on the data.

2. Review

Review the tabulations, statistics, and print-outs for any conspicuous errors. These will most easily be found on frequency tables, in cases where the data are obviously not distributed properly. A common symptom of problems with either the data or programs is an inordinate number of missing values for a data item. Errors are often detected on print-outs repeated or inappropriate values for continuous variables. Errors of this type may well have escaped detection in machine edits, or possibly were created in the reformatting programs. Even if no conspicuous errors are found, these various statistics will be useful later as diagnostic tools.

When any errors are detected their cause(s) should be determined and their problem(s) eliminated. This requires checking both the reformatting algorithms and the hard copy interview data. Finally, the file should be updated, and new marginal tabulations, statistics, and prints should be produced.

TASK 7: MERGE DATA FILES

In order to analyze error in the Pell Grant program, the collected data must be manipulated to yield a single file of the

best, most reliable data and award calculations. This file is created by a series of merge programs which build the final file by retaining values from the various data files. The merge programs are ordered in such a way that the most valid data file is merged first, the second most valid is merged second, and so on down to the least valid data. In this way data items begin with missing values and are assigned the most valid available value as each new data source is merged. The purposes of the merge system are:

- To make final determination of the student's marital and dependency status, and, if dependent, the marital status of the parent
- To proceed in a step-by-step manner, from most reliable to least reliable data files, allowing for intermediate checks on the quality and appropriateness of data
- To provide the "best value" data file from which any error computations can be made

Procedures

Note that the merge programs here have been developed by Advanced Technology, and with certain modifications and enhancements they could be revised for subsequent error studies.

1. Code Dependency and Marital Status

The first program in the merge should collect the necessary information to code the student's dependency and marital status. The status information is necessary to determine what data are appropriate in each case. For example, if a particular student is independent, then no parent information should be retained. Or, if a dependent student's father has died in the previous year, then the merge process must be programmed not to retain his

income, even though it may be reported on some data sources. The initial merge program reads the dependency and marital status items from all the following files available: parent interviews, student interviews, and student aid reports.

2. Prioritize Data

Any data corroborated by a signed legal document, such as a signed tax form, a certified savings account passbook, or a mortgage, should be considered documented data and given priority over undocumented data. Such data, however, may or may not be available in any given study. If they are available, then the data from status and marital questions should be given the following priority: parent documented, student documented, parent undocumented, student undocumented, and SAR. If documented data are not available then the final three categories are the relevant ones, and their order remains the same. Variables which will contain the codes for dependency status (STATUS), students marital status (MAR-1), and parents marital status (MAR-2), and "flag variables" to code the source of the data, are initialized with missing values. As each file is merged, the program fills any missing value with the available data. When a case takes value a from a file, it codes the corresponding flag variable. After the last file has been merged, STATUS, MAR-1, and, if status is dependent, MAR-2 should have values. Any case for which these values are still missing must be dropped from the sample.

3. Merge Files

The next program in the merge should initialize all variables which pertain to tax data (e.g., adjusted gross income or medical and dental expenses), as well as the corresponding source flag variable, to missing values. The tax data file will now be merged to recode these variables with the appropriate values. The SAS program will sort out relevant data using the dependency and marital status values and a series of IF, THEN DO loops. In some cases, data will be irrelevant, such as an independent student's parent tax data, and they will be rejected. Tax data should be merged before other data because they are the most reliable. Figure 5-6 shows the priority of the data sources for the "best values" variables used in the Stage One study and indicates the order in which files should be merged. Variable names are given along with their descriptions. PARC, STUC, and SRAD represent the parent certified, student certified, and student record abstract documented files, respectively. PARN, STUN, and SRAW represent the parent noncertified, student noncertified, and SRA weakly documented files.

Following the IRS file, the parent interview, then student interview files should be merged in the same manner. All necessary "best value" variables have been initialized by this point, as well as the means and extremes for some of the continuous variables.

The next step in the merge is to determine whether student's dependency status is different on the best value file from the SAR. SAR and Student Record Abstract (SRA) data will not be

decreasing priority →

BEST VALUE VARIABLE NAME	IRS	PARC	STUC	SRAD	PARN	STUN	SRAW
CTZN (citizenship)			1	2		3	4
MAR-1 (student marital)				1		2	3
BA (bachelor's degree)				1			
PAR 80 (Did student live with parents in 1980?)			1	2	3	4	5
PAR 81 (in 1981?)			1	2	3	4	5
EX 80 (Did parents claim student as exemption in 1980?)		1	2	3	4	5	6
EX 81 (in 1981?)					1	2	
SP 80 (Did parents give student $700 support in 1980?)				1	2	3	4
SP 81 (in 1981?)				1	2	3	4
HSHLD (number in household)				1	2	3	4
INCOL (number in college)				1	2	3	4
MAR-2 (parent's marital)				1	2	3	4
FILED (IRS filed?)					1	2	
FILAS (estimated)					1	2	
EXMPS (number of exemptions)	1	2	3	4	5	6	7
AGI 80	1	2	3	4	5	6	7

FIGURE 5-6

DATA MERGE PRIORITY TABLE
USED IN STAGE ONE QC STUDY

decreasing priority →

BEST VALUE VARIABLE NAME	IRS	PARC	STUC	SRAD	PARN	STUN	SRAW
TAX 80 (taxes paid)	1	2	3	4	5	6	7
ITM 80 (itemized deductions)	1	2	3	4	5	6	7
SS (Social Security payments)		1	2	3	4	5	6
NONTAX (income of head of household)				3	1	2	4
INC-1 (income of head of household)		1	2	3	4	5	6
INC-2 (second income)		1	2	3	4	5	6
MED 80 (medical/dental expenses)	1	2	3	4	5	6	7
TUIT (tuition paid for high shcool)		1	2	3	4	5	6
CASH (cash assets)		1	2	3	4	5	6
HOMEV (home value)		1	2	3	4	5	6
HOMED (home debt)		1	2	3	4	5	6
INVV (investment value)		1	2	3	4	5	6
INVD (investment debt)		1	2	3	4	5	6
BUSV (business value)		1	2	3	4	5	6
BUSD (business debt)		1	2	3	4	5	6
VAM (monthly VA pay)			1	2		3	4
VA-M (number months VA pay)			1	2		3	4

FIGURE 5-6 (cont'd)

DATA MERGE PRIORITY TABLE
USED IN STAGE ONE QC STUDY

decreasing priority →

BEST VALUE VARIABLE NAME	IRS	PARC	STUC	SRAD	PARN	STUN	SRAW
SSMO (monthly SS pay)				1			2
SSNMO (number months SS pay)				1			2
INC 80 (dependent student income)		1		2	3	4	5
ASETS (dependent student assets)			1	2		3	4
FRMV (farm value)			1	2	3	4	5
FRMD (farm debt)			1	2	3	4	5

FIGURE 5-6 (cont'd)

DATA MERGE PRIORITY TABLE
USED IN STAGE ONE QC STUDY

valid in these cases. The file must be broken into two sets, one containing cases where the status changed, the other containing the rest of the cases. The first file, the status changers, should then be merged with undocumented data if the documented/undocumented distinction exists. Otherwise, the file for these cases has all of the "best values" and is ready for the SAI and AWARD computation programs. The second file must be read into merge programs to merge data from the SAR file, the SRA file, and the undocumented data they are available.

4. Compute SAI and Award

The merging of "best value" data is now complete. The remaining tasks to prepare the data for error analysis are to calculate the SAI, the correct awards, and the discrepancies between these calculated values and the reported values. The program to calculate SAI will merge the status changer file and will calculate SAI for each case. The last program will merge the file with "best values" and SAI with the institutional interview file, from which values for cost of attendance, other expense data, and full-time status definitions can be taken. The program should then compute the correct award for each student. Finally, the program should calculate discrepancies between calculated SAI and the SAI reported on the SAR, and between the correct award and the award reported on the SRA file. The file is now ready for any error computation and analysis.

The merge programs require considerable space in the computer, a fact which can cause problems for the programmer. The scope of the problem depends on the amount of data collected and

coded in the data files. This problem can be minimized by dropping the incoming data variables from the merged file at the end of each program. If the documented/undocumented (or validated/nonvalidated) distinction is operable, then this means that the relevant files must be re-merged when the undocumented data are to be merged. However, it may be advantageous to keep certain variables when they are merged the first time. For analysis purposes it is useful to keep the SAR file data as variables separate from the "best values."

TASK 8: CONDUCT QUALITY CONTROL CASE REVIEW

After the best value file has been created a careful check of the data should be made to determine the success of the merge programs and to ensure the reliability of the data. It has been found that the most effective test is case review, i.e., checking print outs of cases against the hard copy data. This should be done by personnel who thoroughly understand the data and the statistical analyses for which thye are to be used. The goal of case reviewing is, first, to test the workings of the merge programs. In particular:

- Whether status items were correctly determined
- Whether correct values were reported
- Whether they came from the correct sources

Second, the case reviewing tests the overall reliability of the data for both random and systematic problems such as:

- Keypunching errors
- Coding errors

- Interviewer errors
- Inconsistencies within individual cases

Case reviewing will usually produce several problems to be corrected by modifying one or more of the merge programs, as well as updates on a case-by-case basis. After changes have been made a final case review should be done to be sure no new problems have arisen.

Procedures

1. Select Sample

Since the entire population cannot be inspected, select a sample of cases to review. There are several ways of selecting this sample. One way is to sort the file by award discrepancy and take the cases with the largest discrepancies. In this type of sample any gross errors, like keypunch errors or merge errors, are likely to appear. Another type of sample is a random sample, or a random sample stratified by some variable such as disbursement amount ranges, award discrepancy ranges, AGI ranges, etc. In these types of samples, the systematic errors are more likely to appear. The case review should be done with a couple of different types of samples, if time and budget constraints permit. The size of the sample will also depend on these considerations.

After the sample has been chosen, gather the file and hard copy data for those cases. All hard copy data used in the creation of the file will be needed (i.e., tax forms, parent and student interview data, SARs, and SRAs). Print all the best value variables, the SAR variables used in calculating awards and

award discrepancies, and the student I.Ds. In addition, include the source flag variables that form the best value file.

2. Review and Update

Compare the hard copy data with the file data. Be careful to find the best value for each variable in the documentation to check against the file. In reviewing the cases, one must be well versed in all the possible mitigating circumstances which cause some otherwise valid-looking values to be passed over.

When an error is found, determine whether it is a systematic error or a keypunch/editing/coding error. Systematic errors are those which occur every time the same conditions are present in a case. For example, if all dependent students with a recently widowed parent have two different parent incomes on the file, then it is assumed that a systematic error is occurring.

If errors are found, correct the file through an update of the merge programs, or an ad hoc merge program which selects the affected cases and corrects them. Keypunch/editing/coding errors can be individually corrected on the file itself, although other errors of this type will remain. If a great number of these types of errors are found, then closer investigations are needed to see if they are, in fact, due to some systematic error.

After all the necessary program changes and file updates have been made the previous error cases should be checked to see that the problems have been solved. A new sample is then drawn and the cases reviewed to see that new problems have not arisen.

CHAPTER 6

GUIDELINES FOR CONDUCTING DATA ANALYSIS

PRELIMINARY STATISTICAL ANALYSIS

Grouping Unit Records for Analysis

Once error values have been assigned to each sample case, rules for including cases in summary statistical runs should be specified. These rules should address the following issues:

- Inclusion or deletion of cases (unit records) where no disbursements are recorded
- Inclusion or deletion of cases where data collection is incomplete
- Inclusion or deletion of cases where verification data are incomplete

Specification of inclusion rules involves the considerations detailed below.

Zero Disbursement Cases

There are several reasons why there may be no recorded Pell award disbursement for a given case. For example, (1) the student may have been considered ineligible for a grant by the institution, and therefore no grant was awarded; (2) the student may have withdrawn from school before picking up his or her award; (3) the student may have decided not to pick up the award for personal reasons; and (4) there may have been an error in institutional disbursement records. Different explanations for zero disbursement have different implications for analysis. In some cases, zero disbursement reflects correct institutional behavior, and in others it may reflect either an error in bookkeeping or administrative procedures.

Analysts should specify which option is to be used in choosing which cases, if any, should be deleted in error analyses:

> Option 1: Delete all unit records with zero disbursement data or missing disbursement data.
>
> Discussion: Cases with no recorded disbursement do not represent recipient cases; if the study is restricted to error in the recipient population, cases with no award disbursement should be deleted from analyses.
>
> Option 2: Delete cases selectively after case review.
>
> Discussion: If institutional data permit, case-by-case review can determine whether disbursements were withheld by institutions because students were deemed ineligible. These cases could be retained in file, because error calculations take eligibility criteria into consideration. Cases where students fail to pick up awards for various personal reasons would be deleted from the file. This option provides a more accurate measure of the correctness of institutional procedures among SAI-eligible applicants. There is also reason to retain these cases if measurements of student error only are being made, since disbursement errors or missing disbursement data are irrelevant to measures of student error.

Incomplete File Data

Cases where data collection is not complete may not be appropriate for analysis. Specifications must be set out for cases in which different types of data collection are not present in the merged data files.

All possibilities for missing data types should be specified. This can be done using a Guttman scale-type system, where the most essential data collections, probably students' official aid indexes, are rated most important, and each other data source, e.g., IRS data, interview data, student record data, is ranked in priority order. If the most important data are missing for a case, the case should be deleted from the study

regardless of what other data have been collected. Decision rules for a study with five data sources--SARs, tax forms, parent and student interviews, and institutional data--might then be specified as follows:

- Cases missing SARs (or disbursement SAIs) are deleted.
- Cases where institutional data files are missing are deleted.
- For dependent students, cases missing both parent interview and parents' IRS forms are deleted.
- For independent-filing students, cases missing both student interviews and student tax forms are deleted, unless parent interviews are present and indicate that students are dependent.

Incomplete or Missing Verification Data

The most serious inclusion/exclusion decision to be made is the decision regarding measurement of error in cases where full verification data have not been obtained for all items. If the confirmatory approach to verification is taken (as discussed in Chapter 2), no (zero) error can be calculated in cases where no verification data exist. Cases where no documentation has been coded can be identifed by the flags created in the data files. Analysts therefore choose between several options:

> Option 1: Select all otherwise complete cases, allowing zero error to be counted in cases with no documentation (e.g., no verified values).
>
> Discussion: This selection option will provide the most accurate measure of error caught by the methodology used in the study.
>
> Option 2: Select only cases where flag variables indicate that selected items (e.g., AGI, dependency status) have been verified.

Discussion: This option provides an estimate of error among the population for whom documentation has been provided, e.g., all recipients for whom a 1040 has been collected. Such an estimate will be a biased one, because the population for whom tax forms have been obtained will differ from those for whom a tax form has not been obtained. Thus, estimates drawn using this selection procedure cannot be applied to the entire population of recipients without analysis of the sampling bias involved and appropriate adjustment of the estimates.

Option 3: Perform initial analyses as in Option 1, then assign the mean error measure to cases where no verification/documentation has been collected. This can be done by simply adding an adjustment factor (the proportion of unverified cases times mean error) to the total measured error for the population after analytical programs have been run on all available cases.

Discussion: This option provides an estimate of total population error which is based on the hypothesis that error in undocumented (or unverified) cases is equal to error in documented cases. Analyses may indicate that this hypothesis is incorrect. In that event, the adjustment factor must be changed.

Assigning Error in Categorically Ineligible Cases

The formulae for measuring overall payment error in the Pell program (Chapter 2) differentiate student and institutional error. Categorically ineligible recipients create special measurement problems because entire disbursements are counted as institutional error. In some instances, analysts may want to measure payment error without assigning total disbursements to ineligible recipients, or specific types of ineligible recipients, as institutional error.

Institutional data include specific items relating to all categorical eligibility. These may be used to create a single eligibility item. The following coding system assigns 10 unique

eligibility scores related to all the categorical eligibility criteria:

0 = eligible by all categorical criteria
1 = no valid statement of educational purpose
2 = no financial aid transcript
3 = student holds B.A. degree
4 = not a citizen or eligible U.S. resident
5 = not enrolled at least half time
6 = not in a course of at least six months duration
7 = in default on a Federal loan
8 = not making satisfactory academic progress
9 = not in a Pell-qualified program

Using these codes analysts can then select the cases in which all disbursements should be assigned as institutional error.

This system makes it possible to assign error differently in different calculations, e.g., to not measure Pell payment error in cases where SEPs or FATs are missing, or to totally disregard institutional categorical error and to measure only student error and institutional error related to disbursement, calculation, and accounting procedures. (See Chapter 2 for a discussion of different types of institutional error.)

Generating Descriptive Statistics

Basic measures of overall payment error may be presented in a variety of ways. The most important descriptive statistics to be produced are the univariate statistics which show the incidence and general form of overall payment error.

The basic univariate measures and frequencies should be computed for all payment error variables. The most important measures can be presented as frequencies:

	Cases where:
Absolute payment error Net payment error	Verified award ≠ Disbursed award
Overpayment error award	Disbursement > verified
Underpayment error award	Disbursement < verified

Standard statistical packages normally produce frequency tables showing the frequency (case count), cumulative frequency, sample percentage, and cumulative percentage represented by each frequency category. Analysts may want to report counts or percentages (e.g., percent of the sample with error), or frequencies of the size of error within specified ranges. Figure 6-1 illustrates a shell for illustrating simple frequencies of overall error in the Pell program. Figure 6-2 shows a shell for reporting frequencies grouped into ranges of award error in dollars in 1980-81.

Standard statistical software packages (SAS, SPSS, etc.) also generate a series of univariate statistics and graphic representations of univariate distributions. Analysts will want to review the appropriate univariate statistics--means, medians, standard deviations, skewness, etc.--in order to determine the nature of the distribution of error. Particularly useful summary statistics can be generated quite easily with standard statistical packages (e.g., SUMMARY and UNIVARIATE in SAS, CONDESCRIPTIVE

ERROR TYPE	ESTIMATED % OF RECIPIENTS WITH THIS ERROR[1]
1. Student Error	
2. Bachelor's Degree or Citizenship Error	
3. SEP or FAT Error	
4. Program Eligibility Error	
5. Cost of Attendance Error	
6. Enrollment Status Error	
7. Calculation Error	
Sum of All Errors	

[1]Individual recipients may have more than one type of error. Therefore, individual error rates do not add up to the total.

FIGURE 6-1

EXAMPLE TABLE SHELL
FOR REPORTING SIMPLE FREQUENCIES
OF OVERALL PAYMENT ERROR

AWARD ERROR	PERCENTAGE OF CASES: ALL STUDENT & INSTITUTION ERROR	PERCENTAGE OF CASES: STUDENT & INSTITUTION ERROR NOT INCLUDED AEP/FAT ERROR	PERCENTAGE OF CASES: STUDENT ERROR NOT INCLUDING AEP/FAT ERROR
- $551 and less			
- $251 to - $550			
- $151 to - $250			
- $51 to - $150			
- $3 to - $50			
$2 to - $2			
$3 to $50			
$51 to $150			
$151 to $250			
$251 to $550			
More than $550			

FIGURE 6-2

EXAMPLE TABLE SHELL
FOR REPORTING FREQUENCIES GROUPED
INTO RANGES OF AWARD ERROR

in SPSS). Statistical packages also produce various graphics, such as bar charts (histograms) or pie charts which depict frequency disbtributions in readily understandable ways. Error frequencies may be run for particular subpopulations, e.g., dependent students or nonvalidated students. Mean error statistics for subpopulations are also useful. Figure 6-3 shows a sample bar chart (the height of the bars is purely illustrative) of the absolute mean dollar error for institutions rather than for students. The ranges represented by the bars are determined by the analysts; the height of the bars represents the relative frequency of observations within each range.

BIVARIATE ANALYSIS

The first step in investigating the correlates or causes of payment error is to determine whether specific student, institution, or program characteristics are associated with the incidence or size of payment errors. Bivariate analyses, i.e., two-way tables and/or statistics measuring the strength of association between two variables, can be extremely useful in both answering questions about specific relationships and in exploratory data analysis. Contingency tables (crosstabs) can be used to evaluate the validity of hypotheses regarding the causes of error in the Pell program. Because the factors contributing to student error may be totally different from those related to institutional error, separate bivariate analyses should be run for each type of error as well as for overall payment error categories.

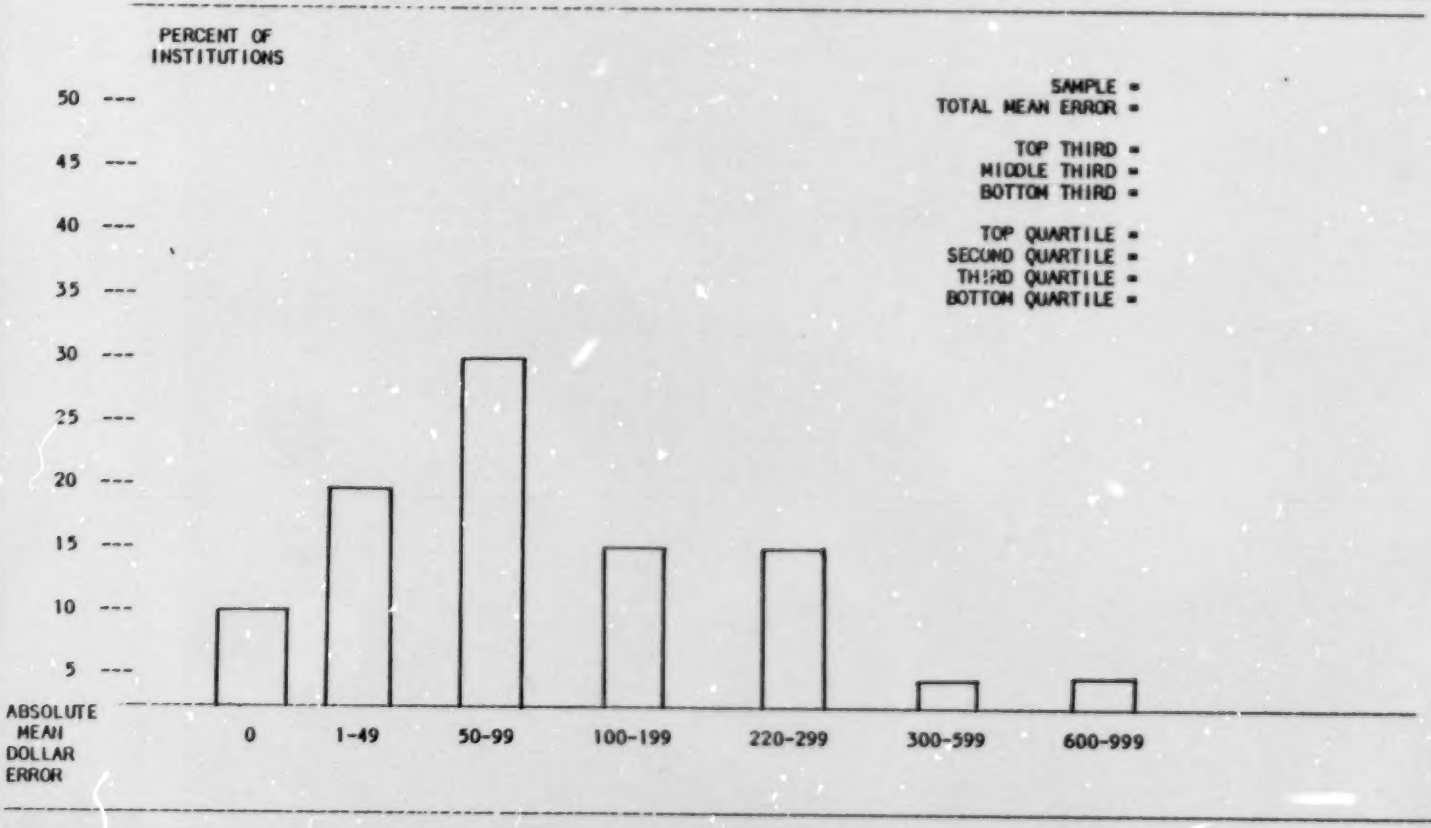

FIGURE 6-3

EXAMPLE BAR CHART
FOR REPORTING ABSOLUTE MEAN
DOLLAR ERROR FOR INSTITUTIONS

A number of factors associated with payment error can be drawn from previous studies of error in the Pell system. Dependency status, income, family size, type of school attended, etc., may be associated with the incidence of overpayment error among students. Institutional error rates may differ among public, private, or proprietary institutions, or among different types of institutions (universities, colleges, junior colleges, or less than two-year programs). Student or institutional error rates may also be associated with different institutional procedures, e.g., institutional validation, use of automated procedures, or institutional QC checks. The size, professional composition, or training of financial aid and staffs may also be factors. Previous Pell studies provide a large number of hypotheses regarding the factors associated with error in the Pell program. Analysts may wish to explore other possible factors as well.

Contingency tables can also be used as a fairly crude means of exploratory data analysis. Analysts may decide to run a relatively large number of tables simply to see if any interesting and unexpected relationships show up. Generating large numbers of samples using standard statistical packages (assuming efficient programming) is not particularly expensive and may prove quite useful, especially in early stages of analysis. The review of a series of tables may alert analysts to unusual relationships in the data which should be investigated more thoroughly.

Organizing Bivariate Analysis

Analysts should identify the tables they would like to produce in a systematic way in order to reduce computer costs.

Initial bivariate runs can be specified by listing student, institution, and program characteristics which analysts have reason to believe may be associated with payment error. For each of these independent variables, analysts can then select which error measurement--total error, student error, institution error--and what categories of error (ranges, means, etc.) they want to look at. An example of a matrix of cross tabulations is shown in Figure 6-4. The list of characteristics or factors possibly associated with error is merely illustrative and is in no way designed to be an exhaustive listing of useful bivariate analyses. Each "X" represents a table which would produce meaningful data for analysts seeking to understand the causes of error in the Pell program. Analysts should specify the particular ranges and/or statistics they would like to see for each table in this type of matrix in order to maximize programming efficiency.

Measures of Association for Two-Way Contingency Tables

Standard statistical packages allow analysts to generate a wide range of test statistics along with contingency tables (cross-tabulations). Those statistics are designed to allow analysts to choose the appropriate test statistic(s) when determining the existence or strength of the relationship between the variables being evaluated. Since statistics, including chisquare (χ) establish only whether the variables are statistically dependent or independent. Others, such as Lamda (λ) measure the strength of the association of nominal (categorical) variables.

	Ranges (Size) Total Error	Ranges (Size) Student Error	Ranges (Size) Institution Error
Student Characteristics			
Dependency Status	X	X	
Income (ranges)	X	X	
Filed Tax Forms (yes/no)	X	X	
Type of Assets Reported	X	X	
Demographics			
Age	X	X	
Year in school	X	X	
Family size	X	X	
Region	X	X	
Institution Characteristics			
Type (4-year, 2-year, < 2 year)	X	X	X
Control (public, private, proprietory)	X	X	X
Size (enrollment)	X	X	X
Number of Pell Recipients	X	X	X
Size of Financial Aid Staff	X	X	X
OSFA Training	X	X	X
Procedures			
Institutional validation	X	X	
Collect documentation	X	X	
Automated systems	X	X	X
QC system in place	X	X	X
Program Characteristics			
Validation (random, PEC)	X	X	X
MDE Processor	X	X	
Recent Program Audits, Reviews	X	X	X

FIGURE 6-4

EXAMPLES OF TWO-WAY CONTINGENCY TABLES FOR ANALYSIS OF OVERALL PAYMENT ERROR

This statistic, for example, would be useful in interpreting data relating dependency status to the existence of overpayments, underpayments, or correct award disbursements. Other statistics, such as gamma, take the order or direction, of table categories into account, so that scores reflect both the strength of the relationship and the way that one variable (e.g., AGI group) is associated with another (e.g., size of payment error category). Analysts should be careful to choose appropriate test statistics when evaluating contingency tables.

MULTIVARIATE ANALYSIS

Multivariate analysis needs to be differentiated from the bivariate techniques discussed above. Bivariate techniques test for the existence of differences in error levels among groups of students, where grouping would be based on a single characteristic of the student, his or her family, or the institution attended regardless of the differences across the groups. Thus the two variables involved in a bivariate analysis are (1) error level and (2) the single case characteristic.

Multivariate techniques are designed to address more complicated (but conditional or contingent) questions of relationships between error and characteristics of students, families, and institutions. Rather than asking if a relationship exists between error and a single characteristic, multivariate analysis asks whether a relationship exists between error and a single characteristic while allowing relationships between error and

other variables to simultaneously exist. Put another way, multivariate models assume or allow that error is affected or determined by a multitude of characteristics. As discussed in the following, it is necessary to make assumptions about the form of this multiple determination in order to effectively utilize multivariate analysis.

In a program as complicated as Pell Grants, and in one involving complex human behavior, it is unlikely that the simple relationships assumed in bivariate analysis exist. However, care must be exercised when using multivariate techniques since, while they do not assume simple relationships, they do require assumptions about the form, structure, and nature of the complex multiple interactions among error and characteristics.

There are three purposes which can be served by multivariate analysis:

- Testing of a priori hypotheses
- Exploratory data analysis
- Error-prone modeling

The first two represent the two methodological approaches to empirical research. Error-prone modeling represents an application of multivariate modeling to the development of decision rules.

Hypothesis testing is a methodological approach where hypotheses and theories are subjected to real world data in order to confirm or reject these hypotheses. Exploratory analysis, on the other hand, uses the real world data to develop the hypotheses and theories.

Hypothesis Testing--Hypothesis testing involves four steps:

- Enumeration or specification of policy-related hypotheses
- Selection of appropriate test statistics
- Specification of the model which comes from the theory
- Estimation and testing

Developing the list or set of hypotheses to be tested depends on numerous sources. One source would be previous Pell Grant error studies. A second source would be relevant financial aid literature. Policy and program experts can also supply policy-related questions which can be expanded by suggestions from budget and planning personnel. Generally, a hypothesis would involve testing for the existence of a relationship between level of error or probability of error and a student, family, or institutional characteristic.

Each hypothesis test can result in four outcomes:

- Reject a true hypothesis
- Accept a false hypothesis
- Reject a false hypothesis
- Accept a true hypothesis

The last two outcomes represent correct decisions while the first two represent erroneous decisions--type I and type II errors, respectively. It would be desirable to select or create decision rules and test statistics which minimized the chances of these two types of errors. However, with a given sample size reducing the chance of making a type I error increases the chance of making a type II error, and vice versa. In order to determine

the optimal trade-off between the chances of making the two types of errors requires knowledge of the cost and/or consequences of each type of error. Thus, one must know the consequences of accepting the existence of a relationship when, in truth, one does not exist and of rejecting the existence of a relationship when, in truth, such a relationship does exist.

Model specification plays a crucial role in multivariate analysis because any relationship being tested is assumed to exist in the presence of many other relationships. The model specifies the form of such relationships, and the tests focus on the existence of that particular type of relationship. For example, one might assume that characteristics are nearly reduced to error measures, perform a test, and conclude a relationship does not exist. However, if the relationship was multiplicative, experimental, or logarithmic, such a conclusion would be false since the truth is that a linear relationship does not exist. In the extreme, rejecting a hypothesis about the existence of a relationship requires rejecting all possible forms the relationship might take on. Therefore, any conclusions drawn are conditional on choice of functional form, specification of the error structure, and choice of the characteristics jointly considered to affect error levels.

Once decisions concerning the hypothesis, the decision rule trade-offs, and model specification have been settled, the selection of statistical instructing techniques and methods remains. Figure 6-5 presents characteristics of various multivariate techniques. In Pell Grant error studies the dependent variable

Technique	Type of Dependent Variable (y)	Type of Independent Variables (x)	Comments
Multiple Regression (Ordinary least squares)	A. Continuous	Dichotomous (0,1), continuous, or mixed. Equivalent to ANOVA if all dichotomous and to ANCOVA if Mixed.	Basic technique with variations: stepwide, weighted, restricted, time-series, equation systems.
Probit	A. Dichotomous B. Special version for N-chotomous (ordinal) available	Dichotomous, continuous, or mixed. If all dichotomous, contingency tables are cheaper and simpler.	Interpretation a bit messier than logit.
Logit	Same as probit	Same as probit	Easier to interpret than probit. More robust to assumption violations than discrimant analysis.
Discriminant Analysis	Dichotomous	Supposed to be all continuous and distributed multivariate normal, but this is very commonly violated.	Allows user to incorporate a priori estimates of event probabilities to make estimates more efficient. Estimation programs more refined to give displays, measures of goodness of fit, etc.

FIGURE 6-5

CHARACTERISTICS OF VARIOUS MULTIVARIATE TECHNIQUES

Technique	Type of Dependent Variable (y)	Type of Independent Variables (x)	Comments
Automatic Interaction Detection (AID)	Continuous. A version, called THAID, exists for dichotomous case.	Dichotomous or N-chotomous. (Can recode continuous variables to achieve this.)	Should not use if N is less than 3000. Technique is "stepwise ANOVA." Best used in "fishing" for a set of independent variables and interaction terms to be included in a regression.
ANOVA (One-way)	Continuous	A single ordinal or categorical variable. (Representing that variable as a set of dichotomous variables in multiple regression is equivalent.)	
ANOVA (K-way)	Continuous	K ordinal or categorical variables. (Representing each variable as a set of dichotomous variables in multiple regression is equivalent, if interaction terms are included.)	

FIGURE 6-5

CHARACTERISTICS OF VARIOUS MULTIVARIATE TECHNIQUES (Cont'd)

would be level of error (continuous) or the existence of error (dichototmous). Independent variables would include student, family, and institution characteristics.

Exploratory Analysis--This type of multivariate analysis differs from hypothesis testing in that here the relationships which exist in the data are determined. In hypothesis testing one asks whether certain pre-established relationships exist in the data. Therefore, in exploratory analysis theories are built from data, whereas in hypothesis testing theories are tested against data.

Two basic methods are recommended for exploratory data analysis:

- Automatic Interaction Detector
- Stepwise multiple regression

Both these methods are embedded in existing software packages which define search algorithms. As such, these analyses can be replicated by other data analysis.

The AID program involves a sequential search for binominal splits leading to maximum exploratory power or predictive models. Stepwise regression can use a number of search algorithms, such as:

- Forward inclusion
- Backward exclusion
- Maximum predictive ability
- Forward exclusion with backward exclusion
- Minimum predictive ability for inclusion

It is also possible to use any multivariate statistical program and develop customized or researcher-defined search methods.

Error-Prone Modeling (EPM)--EPM is a form of exploratory analysis; however, it differs from the methods just discussed in that its purpose is not to uncover relationships among variables but rather to split a sample into groups where the observations in a group have as similar error levels as possible while error levels across groups are as dissimilar as possible.

Once these groups are defined they can be ranked by error levels as presented in Figure 6-6 which was taken from the Stage One Quality Control report. Group 35 had the highest average error ($381) representing 4.1 percent of total error and 1.0 percent of the students. Group 16 had the lowest net overpayment (21), representing about 4 percent of total error, but nearly 20 percent of the students.

Definitions of these groups are presented in Figure 6-7.

These data can then be used to develop a Lorenz-type curve relating cumulative error and cumulative cases. This method of data presentation can be used to develop validation rules and levels of effort. For example, if the policymaker wanted to remove 40 percent of new overaward, this could be accomplished by validating about 15 percent of the cases. These 15 percent would be groups 35, 27, 33, 29, 37, 31, 34, and 32, the first through eighth ranked groups. An example of a Lorenz-type curve is shown in Figure 6-8.

GROUP NUMBER	NET ERROR	CUMULATIVE NET ERROR %	NUMBER OF CASES	CUMULATIVE NUMBER OF CASES %
35	$ 381	4.1	31	1.0
27	371	7.9	29	1.9
33	330	10.8	25	2.7
29	307	14.6	36	3.8
37	261	19.4	53	5.5
31	226	24.6	65	7.5
34	224	32.7	104	10.7
32	160	40.2	135	15.0
24	151	50.1	188	20.8
26	141	56.3	125	24.7
28	98	59.3	89	27.5
30	98	65.5	179	33.1
12	86	78.0	419	46.2
20	85	84.6	223	53.2
39	63	85.2	25	54.0
18	48	89.1	231	61.2
8	38	96.5	560	78.7
36	38	96.8	25	79.5
16	21	101.4	629	99.2
38	-151	100.0	27	100.0

FIGURE 6-6

EXAMPLE TABLE
FOR REPORTING ERROR-PRONE GROUPS

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	GROUP NUMBER									
	36	27	33	29	37	31	34	32	24	28
Status	Dependent	Independent	Dependent	Dependent	Dependent	Dependent	Dependent	Dependent	Dependent	Independent
Taxes Paid	Over $2,000		Over $500	$500 or Less	$500 or Less	$500 - $2,000	Over $2,000	Over $500	Over $2,000	
Income Portion of Father Student		Over 78%								Over 78%
Business/Farm Value				$10,000 or Less	Over $10,000					
Number in College	2 or More		One			Two or More	Two or More	One	Two or More	
Tax Figures Estimated		Not From Filed Return								Not From Filed Return
Net Household Assets			Over $15,000	Over $20,000				Over $15,000		
Number Of Exemptions					Over 5					
Initial SEI	1,000 or Less		1,200 or Less	900 or Less			1,000 or Less	1,200 or Less	Over 1,000	
Age of Student		Under 22								Over 22
House Value						Over $35,000				
Home Equity										
Adjusted Gross Income			$12,000 or Less	Over $10,000				Over $12,000		
$750 Support in 1980	No						Yes			

	GROUP NUMBER									
	28	30	12	20	39	18	8	38	18	38
Status	Dependent	Dependent	Independent	Dependent	Dependent	Dependent	Independent	Dependent	Dependent	Dependent
Taxes Paid	$500 or Less	$500 - $2,000		Over $500	$500 or Less	Over $500		$500 or Less	$500 or Less	$500 or Less
Income Portion of Father Student			Over 78%				78% or Less			
Business/Farm Value	$10,000 or Less				$10,000 or Less			Over $10,000	$10,000 or Less	$10,000 or Less
Number in College		Two or More		One		One				
Tax Figures Estimated			From Filed Return							
Net Household Assets	Over $20,000			$15,000 or Less	Over $20,000				$20,000 or Less	Over $20,000
Number of Exemptions								5 or Less		
Initial SEI	900 or Less			1,200 or Less	Over 900	Over 1,200				Over 900
Age of Student										
House Value		$35,000 or Less								
Home Equity										
Adjusted Gross Income	$10,000 or Less				$30,000 or Less					Over $30,000
$750 Support in 1980										

FIGURE 6-7

EXAMPLE TABLE FOR PRESENTING DEFINITIONS OF ERROR-PRONE GROUPS

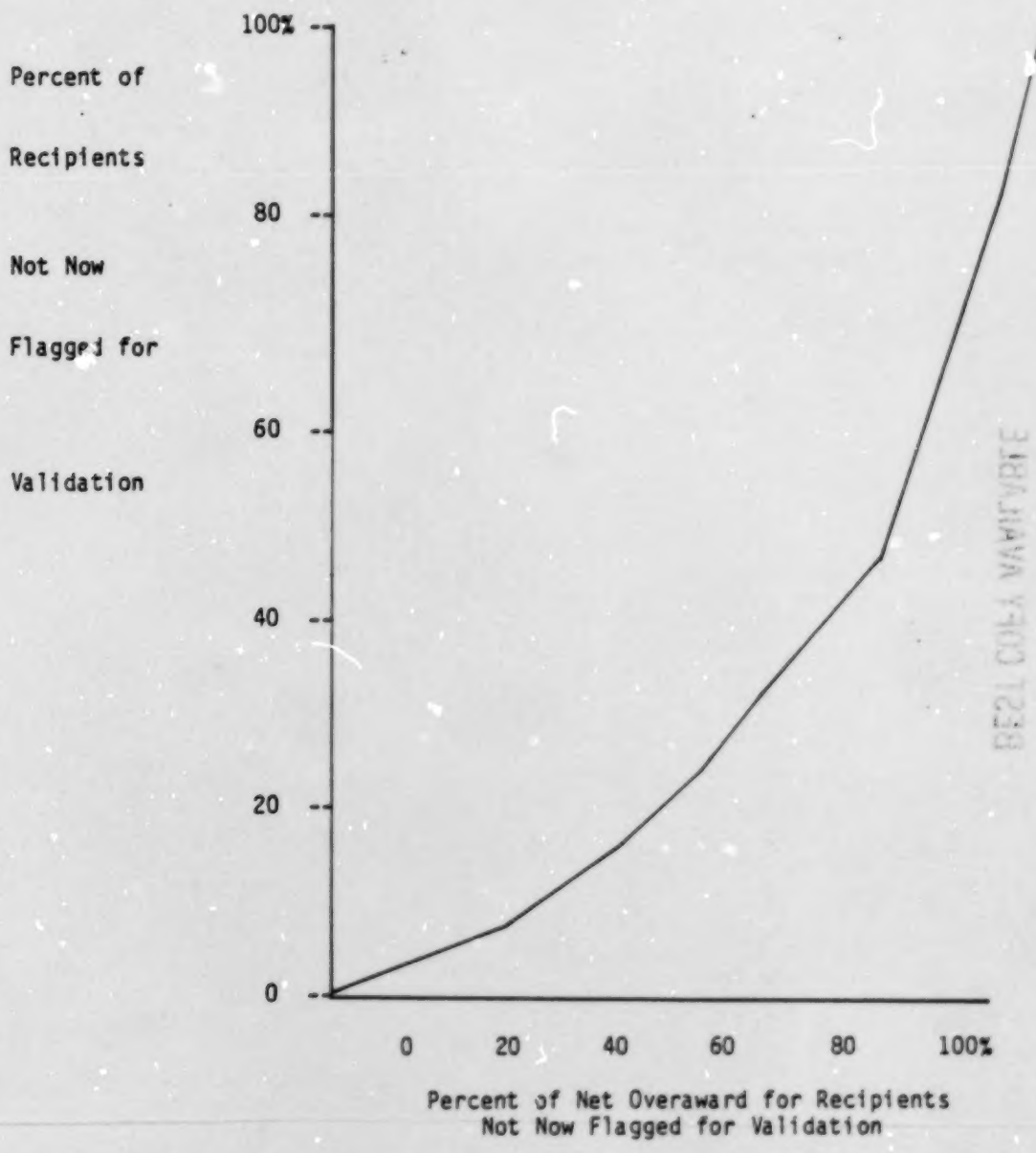

FIGURE 6-8

EXAMPLE OF
"LORENZ CURVE" FROM ERROR-PRONE PROFILING

APPENDIX A

APPENDIX A

GLOSSARY

AD: Actual Disbursement. The amount of Pell Grant money that a student receives in a given year. Should not be confused with expected disbursement or scheduled award.

ADS: Alternate Disbursement System. One of two methods by which Pell Grants are paid. Because of size or other factors which affect a school's ability to process award payments, a student is paid his or her Pell Grant by the Department of Education instead of by the institution the student attends.

AGI: Adjusted Gross Income. An item on the Pell application. One of the primary factors considered in determining a student's eligibility for a Pell Grant. The application asks for the AGI as reported on IRS Form 1040 or 1040A. For most applicants, AGI is the total income earned from work, plus interest income, dividends, and other taxable income.

BA Error: Bachelor's Degree Error. Students with bachelor's degrees are ineligible for Pell Grants. BA error is considered one of the components of institutional error since certifying whether or not a student has received a BA is the institution's responsibility.

Business or Farm Value/Debt: Two items on the Pell application. The first refers to the market worth of the applicant's (for independents) or parent's (for dependents) business and farm at the time of application. The second refers to how much is owed at the time of application.

Central Processor: The firm, under contract with the Department of Education, which receives and processes all student application data and which produces and distributes SARs.

Citizenship Error: Students who are not U.S. citizens, U.S. nationals, or permanent residents of the U.S. or its territories are ineligible for Pell Grants. Citizenship error is considered one of the components of institutional error since institutions are responsible for certifying an applicant's citizenship prior to the disbursement of a grant.

Cost or COA: Cost of Attendance. Cost is the total of a student's actual tuition and fees, room and board expenses, plus a $400 allowance for books and supplies. It is one of three factors used to calculate an expected disbursement--a student's enrollment status and SAI being the other two.

Cost error occurs when the calculated cost figure used to calculate a student's award does not equal that student's actual cost. It is considered a component of institutional error.

Course Length Error: To be eligible for a Pell Grant a student must be enrolled in a program of study at least six months in length. Course length error is considered a component of institutional error.

Dependent Recipient: A student receiving a Pell Grant as well as significant financial support from his or her parent. For the 1981-82 Pell Grant award year, dependents were considered those students who met at least one of the following criteria:

1. Lived with a parent for more than six weeks during 1980 or 1981

2. Was claimed as an exemption on a parent's 1980 or 1981 tax form

3. Received more than $1,000 of support from a parent in 1980 or 1981

Eligible Program of Study Error: To be eligible for a Pell Grant a student must be enrolled in a program which leads to a bachelor's, associate, undergraduate professional, or certificate degree. Eligible program of study error is considered a component of institutional error.

Enroll: Enrollment Status. All Pell Grant recipients are considered enrolled on either a full-time, three-quarter time, or half-time basis. Enrollment status is one of three factors used to calculate a Pell Grant expected disbursement.

Expected Disbursement: The amount of Pell Grant money expected to be received by a student during an award period, based on the student's SAI, enrollment status, and cost of attendance. Expected disbursements do not necessarily correspond with actual disbursements.

Family Size: An item on the Pell application. For dependents, includes all people in the parent's household (including the parents) who will receive at least half of their support from the parents during the Pell Grant award year. For independents, includes all people in the student and spouse's household (including the student and spouse) who will receive at least half of their support from the student and spouse.

FAT Error: Financial Aid Transcript Error. Before a transfer student may receive a Pell Grant, the institution must have received and evaluated a certified financial aid transcript from that student's prior educational institution. FAT error is considered a component of institutional error since it is the institution's responsibility to withhold a grant disbursement if an FAT has not been received.

Father's/Applicant's Income: An item on the Pell application. For dependents, refers to the amount of income the applicant's father earned from work; for independents, refers to the amount of income the applicant earned from work.

Grant or Loan Default Error: A student is not eligible to receive a Pell Grant if he or she owes a repayment on any Title IV grant or is in default on any Title IV loan received at that institution. Grant or loan default error is considered a component of institutional error since it is the institution's responsibility to certify that the student does not owe a repayment on a grant or is in default.

Half-time Enrollment Status Error: To be eligible for a Pell Grant a student must be enrolled at least half-time. Since it is the institution's responsibility to certify enrollment status prior to a disbursement, half-time enrollment status error is considered a component of institutional error.

Home Value/Debt: Two items on the Pell application. The first refers to the market worth of the applicant's (for independents) or parent's (for dependents) home at the time of application. The second refers to the amount owed on the home at the time of application.

Independent Recipient: A student receiving a Pell Grant who is not dependent on his or her family for financial support. For the 1981-82 Pell Grant award year, independents were considered those students who had not:

1. Lived with a parent for six weeks in 1980 or 1981
2. Been claimed as an exemption on a parent's 1980 or 1981 tax form
3. Received more than $1,000 of support from a parent in 1980 or 1981

Medical and Dental Expenses: An item on the Pell application. Refers to the amount paid for medical and dental expenses not covered by insurance.

Mother's/Spouse's Income: An item on the Pell application. For dependents, refers to the amount of income the applicant's mother earned from work; for independents, refers to the amount of income the applicant's spouse earned from work.

Nontaxable Income: The sum of three items on the Pell application: Social Security Benefits, Aid to Families with Dependent Children (AFDC), and Other Nontaxable Income. Other Nontaxable Income includes child support, earnings from work not reported on a tax return, unemployment compensation, disability income, and interest on tax free bonds.

OSFA: Office of Student Financial Assistance. OSFA is responsible for administering the five major student assistance programs: Pell Grant, Guaranteed Student Loan (GSL), National Direct Student Loan (NDSL), College Work-Study (CW-S), and Supplemental Educational Opportunity Grant (SEOG). OSFA has a functional organization structure, with management responsibilities assigned according to function rather than program. There are six divisions:

DPPD: Division of Policy and Program Development
DPO: Division of Program Operations
DCPR: Division of Certification and Program Review
DSDD: Division of Systems Design and Development
DTD: Division of Training and Development
DQA: Division of Quality Assurance

Other Assets/Debts: Two items on the Pell application. The first refers to the market worth of the applicant's (for undependents) or parent's (for dependents) real estate and investments and the time of application. The second refers to how much is owed at the time of application. Investments include trust funds, stocks, bonds, and other securities.

PIMS: Program Information Monitoring System. An automated system which monitors the allocation and obligation of Pell Grant funds to institutions, and through institutions, the disbursement of funds to students.

Progress Report: A document completed by all institutions participating in the Pell program which is submitted at least quarterly to the Department of Education. On the Progress Report, the institution details current program expenditures. The report enables the Department of Education to determine if the institution's annual authorization should be raised or lowered.

RDS: Regular Disbursement System. Method by which most students are paid Pell Grants. Institutions on the Regular Disbursement System receive funds from the government, with

the amount received based on the projected number of students attending the institution. Students receive Pell Grant payments directly from the institution.

SAI: Student Aid Index. Number given to applicant, based on applicant's financial strength as indicated by factors such as AGI, Federal taxes paid, family size, and assets. The SAI is combined with the applicant's cost of attendance and enrollment status to determine his or her grant level.

SAR: Student Aid Report. A report returned to the applicant from the Central Processor after the application has been submitted and processed. The SAR provides the applicant with an SAI. The student must submit the SAR to the institution he or she plans to attend before a Pell Grant will be awarded.

Satisfactory Academic Progress Error: To be eligible for a Pell Grant a student must maintain satisfactory progress in his or her course of study. Each institution sets its own standard of satisfactory academic progress, and it is the institution's responsibility to certify that progress is being maintained before it disburses a grant. Satisfactory Academic Progress error is considered a component of institutional error.

Scheduled Award: The amount that a full-time student enrolled for a full academic year is entitled to receive.

SEP Error: Statement of Educational Purpose Error. To be eligible for a Pell Grant, a student must file a statement with his or her institution stating that all funds received through Title IV programs will be used solely for educational or educationally related purposes. SEP error is considered a component of institutional error.

Student's/Spouse's Expected Income: Refers to the sum of four items on the Pell application. Includes all income the applicant and spouse expect to receive during the summer prior to the academic year and during the acadmic year itself.

Student's/Spouse's Net Assets: An item on the Pell application completed by dependent students only. Refers to all the applicant's and spouse's assets (home, investments, business, farm, and savings) minus what is owed on those assets.

Student's/Spouse's Net Income: An item on the Pell application completed by dependent students only. Refers to all the applicant's and spouse's income (taxable and nontaxable) minus the U.S. income taxes that were paid.

Taxes Paid: An item on the Pell application. The application asks for the amount of Federal taxes paid as reported on the IRS Form 1040 or 1040A.

Tuition: An item on the Pell application. Refers to the amount of money the applicant's family paid for elementary, junior high, and high school tuition.

Validation: The process by which a portion of Pell Grant applicants are selected and required to present to their financial aid officer certain documents such as IRS Form 1040 or 1040 and W-2 statements, which confirm the accuracy of the information on the Pell application.

APPENDIX B

MEASUREMENT TOLERANCES

Measurement tolerances in the 1979-80 and 1980-81 studies of error in the Pell Grant program were drawn very tightly. Tolerances for dollar error in application data were two dollars in both studies. Discrepancies between application values and verified values of greater than two dollars are reported as item errors in the study reports. This narrow tolerance band was adopted for several reasons:

1. Much of the available verification is reported, or recorded on documents, in exact dollar values.

2. Computing with exact dollar values is neither more difficult nor more expensive than using rounded figures.

3. The SAI computation formula provides a complicated rounding scheme; rounding application items before entering them into the formula might well produce different SAI scores.

Since exact application item figures are needed for SAI computations, and since collection of exact figures presents no serious data collection, editing, or computer processing problems (in fact, rounding by interviews and coders creates more opportunity for error), it seemed reasonable to make application item error tolerances as tight as the data permitted; the two dollar tolerance was designed to allow for rounding problems related to reporting figures down to the penny.

Reporting of overall payment error figures in the two Pell studies was designed to take these narrow tolerances into consideration. Overall payment error and item error figures were reported not only in total, based on the $2 tolerance, but by ranges, e.g., "within $2," "$2-$50," "$51-$100."

APPENDIX C

ALGEBRAIC SPECIFICATION OF ERROR MEASURES

In order to more clearly define error measures, algebraic specifications have been presented in this appendix. Table C-1 presents the notation used in the following sections.

In addition to recorded values of expected disbursement it is also possible to calculate an expected disbursement using value of enrollment status, student aid index, cost of attendance, and categorical criteria. The following notation is used to represent calculated expected disbursement based on the value of SAI at time of data source n, cost of attendance recorded at time m, enrollment status from source k, and categorical criteria observed at time 1.

ED[SAI(n), COA(m), ENR(k), CAT(1)]

Using the above notation we specify post-reconciliation overall error as follows:

Disb(*) - ED[SAI(*), COA(*), ENR(*)].

For pre-reconciliation overall error the above formula would be modified by using DISB(3) in place of Disb(*).

This total error can be decomposed into student error and institution error as indicated below.

Total Error:

Disb(*) - ED[SAI(*), COA(*), ENR(*)]

Student Error:

ED[SAI(4), COA(*), ENR(*)]
-ED[SAI(*), COA(*), ENR(*)]

Institution Error:

Disb(*) - ED[SAI(4), COA(*), ENR(*)]

Enrollment Status Error:

ED[SAI(4), COA(4), ENR(4)]
-ED[SAI(4), COA(4), ENR(*)]

Calculation Error:

Disb(*) - ED[SAI(4), COA(4), ENR(4)]

Item	Initial SAR	Fall SAR	Student & Parent Interviews	Disbursement SAR	Institution Record Abstract	Reconciliation Roster
Enrollment Status		ENR(1)		ENR(3)	ENR(*)	ENR(4)
Cost of Attendance		COA(1)		COA(3)	COA(*)	COA(4)
Student Aid Index	SAI(o)	SAI(1)	SAI(*)	SAI(3)	---	SAI(4)
Disbursement		--		---	DISB(*3)	DISB(4)
Expected Disbursement		ED(1)		ED(3)	---	
Scheduled Award		SA(I)		SA(3)	---	
Categorical Criteria		CAT(1)		CAT(3)	CAT(*)	

FIGURE C-1

TERMS USED IN ERROR DEFINITIONS

APPENDIX D

AN ESTIMATE OF RESOURCE AND SCHEDULE REQUIREMENTS FOR CONDUCTING AN ASSESSMENT OF OVERALL PAYMENT ERROR IN THE PELL GRANT PROGRAM

This appendix presents estimates of the resource and time requirements for completing a Pell Grant payment error study. Based on a review of several options for collecting the data to routinely measure overall payment error in the Pell Grant program[1], it was recommended that OSFA continue to use the three-faceted approach that was employed in the 1978-79 and 1980-81 Quality Control studies. This approach includes: (1) student record reviews at a sample of postsecondary institutions; (2) field interviews and audits of a sample of aid recipients and their parents; and (3) collection of documentation directly from various government agencies which verifies certain student application information.

Resource Requirements

Figure D-1 provides estimates of resource requirements for five alternative samples of recipients and institutions. These estimates assume an average of 15 recipients per institution. Resource requirements have been classified as direct labor

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[1]The following four options were identified in Chapter 3:

- Option 1. Student record data would be collected by site visits to institutions; students and parents would be interviewed in person; and documentation would be collected by mail from the IRS and other agencies. (The recommended approach.)
- Option 2. Would have the same features as Option 1 except that in-person interviews with students and parents would be replaced by telephone interviews.
- Option 3. Would be a scaled-down version of Options 1 and 2--no student and parent interviews would be conducted.
- Option 4. Would have no field work; all institutional and student/parent data would be collected by mail.

RESOURCE REQUIREMENTS[1]	SELECTED SAMPLES 1 2,500 Recipients 167 Institutions	2 3,900 Recipients 260 Institutions	3 5,500 Recipients 367 Institutions	4 7,100 Recipients 473 Institutions	5 8,700 Recipients 580 Institutions
LABOR (in hours)					
Senior Staff	3,100	3,100	3,100	3,100	3,100
Mid-Level Staff[2]	8,000	9,500	11,300	13,000	14,700
Junior Staff[3]	34,400	48,000	63,600	79,200	94,800
Total Hours	45,500	60,600	78,000	95,300	112,600
OTHER DIRECT COSTS (in $)[4]					
Travel	$123,900	$165,200	$212,500	$259,600	$304,000
Telephone Time	14,800	22,700	32,300	41,600	49,800
Reproduction	24,200	34,000	45,200	56,400	67,600
Postage/Supplies	11,300	17,300	24,200	31,100	38,000
Data Entry	18,300	27,300	40,300	52,000	62,600
Computer Time	36,000	40,500	45,600	50,700	55,300
Other	9,800	10,300	10,800	11,300	11,900
Total Other Direct Costs	$238,300	$317,300	$410,900	$502,700	$589,200

D-2

FIGURE D-1

SUMMARY OF ESTIMATED RESOURCE REQUIREMENTS
FOR FIVE SELECTED SAMPLES:
SELECTION OF SAMPLE PRIOR TO SITE VISITS

[1]Figures in this table are rounded. For a detailed analysis of labor costs refer to Appendix D-1. For an analysis of other direct costs, refer to Appendix D-2.

[2]This labor category includes hours for institutional data collectors.

[3]This labor category includes hours for student/parent interviewers.

[4]Ass co t l' loll.

costs, expressed in hours, and other direct costs (ODC's), expressed in 1982 dollars. Three labor categories are identified: senior, mid-level, and junior. Senior staff include Ph.D.'s and other personnel with significant experience in survey research, computer science, statistics, sociology, education, or economics. Mid-level staff include those at the M.A. or B.A. level with one to six years of relevant experience. Institutional field workers are included in this category. Junior staff include research assistants, clerks, secretaries, and student and parent interviewers.

The following assumptions were made in order to estimate resource requirements for the five selected samples.

- The recipient sample would be drawn by securing a list of each institution's recipients prior to the site visits.
- An institution visit would consist of 15 record reviews and one 45 minute interview.
- The quantity of information collected at each institution and from each student and parent would be approximately the same as the quantity collected during the 1980-81 study.
- The institution sample would be clustered geographically.
- Two hundred field staff would interview the students and parents.
- The student/parent interviewers would be regionally based; the institutional field workers would not be regionally based.
- The analysis requirements would approximate those of the 1980-81 study.
- A replication of the approach used in the 1980-81 study would be conducted with lower development costs and fewer inefficiencies. Instruments, training manuals, procedures manuals, and computer programs were developed for the Stage One study. With modifications, these materials could be reused for future error studies. In addition, the Technical Specifications document would serve as a comprehesive procedures manual.

The policy maker and budget planner must keep these assumptions in mind when interpreting the figures in Figure D-1. Changes in the assumptions can change costs and can result in changes in resource requirements. For instance, decreasing the amount of information required from the student and parent interviews would substantially decrease junior staff labor costs and travel expenses.

Figure D-1 reveals that total direct labor hours increase substantially with an increase in the sample size--a 200 percent increase in the recipient sample size roughly translates into a 100 percent increase in labor hours. A closer examination of the figures, however, indicates that an increase in junior staff (student/parent interviewers and clerks) hours accounts for most of the change. The hours required for higher salaried mid-level and senior staff are not nearly as sensitive to changes in sample size. Therefore, a substantial increase in labor hours due to an increase in sample size does not necessarily mean a substantial increase in the total cost of project staff salaries.

Likewise, Figure D-1 reveals that certain ODC items are more sensitive to sample changes than others. Travel expenses--which include airfare, rental car costs, and per diem--vary substantially with changes in sample size while costs associated with computer time do not.

The estimates in Figure D-1 assume that the recipient sample would be drawn prior to the institutional site visits. Figure D-2 provides estimates if the recipient sample is drawn during the site visits by the institutional field workers. A comparison of Figure D-1 and D-2 reveals that the on-site sample selection approach would be more costly to the government than the pre-visit selection approach. Although senior and junior staff requirements are somewhat less with the on-site approach, mid-level staff needs are significantly greater due to the increased amount of field work. Overall ODCs are slightly greater with the on-site approach, also due to the increased field time.

Of particular interest is the level of effort required of institutional field workers, given the possibility of diverting--or hiring additional--DCPR program reviewers to perform this task. It is estimated that each institutional visit would require 13 hours of field worker time if the pre-visit sample selection approach was used and 20 hours if the sample was chosen on-site. Using these benchmarks, the

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RESOURCE REQUIREMENTS[1]	SELECTED SAMPLES 1 2,500 Recipients 167 Institutions	2 3,900 Recipients 260 Institutions	3 5,500 Recipients 367 Institutions	4 7,100 Recipients 473 Institutions	5 8,700 Recipients 580 Institutions
LABOR (in hours)					
Senior Staff	3,000	3,000	3,000	3,000	3,000
Mid-Level Staff[2]	9,100	11,200	13,800	16,200	18,600
Junior Staff[3]	34,200	47,800	63,400	79,000	94,600
Total Hours	46,300	62,000	80,200	98,200	116,200
OTHER DIRECT COSTS (in $)[4]					
Travel	$135,200	$183,900	$238,900	$293,700	$348,700
Telephone Time	13,500	20,900	29,300	37,800	46,200
Reproduction	24,200	34,000	45,200	56,400	67,600
Postage/Supplies	11,200	17,100	23,800	30,700	37,600
Data Entry	18,300	27,300	40,300	52,000	62,600
Computer Time	36,000	40,500	45,600	50,700	55,300
Other	9,800	10,300	10,800	11,300	11,900
Total Other Direct Costs	$248,200	$334,000	$433,900	$532,600	$629,900

FIGURE D-2

SUMMARY OF ESTIMATED RESOURCE REQUIREMENTS
FOR FIVE SELECTED SAMPLES:
ON-SITE SAMPLE SELECTION

[1]Figures in this table are rounded. For a detailed analysis of labor costs refer to Appendix D-1. For an analysis of other direct costs, refer to Appendix D-2.

[2]This labor category includes hours for institutional data collectors.

[3]This labor category includes hours for student/parent interviewers.

[4]Assumes constant 1982 dollars.

following are estimates of required field worker hours for each of the selected samples and for both sample selection approaches.

Selection of Sample Prior to Site Visits

Sample 1--2,171 hours (271 person days)

Sample 2--3,380 hours (423 person days)

Sample 3--4,771 hours (596 person days)

Sample 4--6,149 hours (769 person days)

Sample 5--7,540 hours (943 person days)

Selection of Sample On-site

Sample 1--3,340 hours (418 person days)

Sample 2--5,200 hours (650 person days)

Sample 3--7,340 hours (918 person days)

Sample 4--9,460 hours (1,183 person days)

Sample 5--11,600 hours (1,450 person days)

If OSFA were to undertake the field data collection using OSFA personnel, then these figures could be used to estimate the labor requirements for data collection efforts of each sample size. This would require either hiring temporary staff or releasing current regional staff to undertake the data collection. In either case training would be required for the data collectors.

A more detailed analysis of labor requirements is found in Appendix D-1. Appendix D-2 contains a detailed breakdown of ODCs. These two appendices contain formulas which the budget planner can use to estimate costs for studies with sample sizes other than the five listed in figures D-1 and D-2. In Appendix D-3 guidelines for estimating costs for collecting student and parent interview information by telephone are presented.

Schedule Requirements

The following series of tables show recommended schedules for conducting the institutional data collection portion of the error study. Figures D-3-1A to D-3-1D present recommended timeframes for conducting a study using the pre-visit sample selection approach for 10, 15, 20, 20 and 25 data collectors. Figures D-3-2A to D-3-2D show schedules for 10, 15, 20, and 25 data collectors when an on-site selection approach is used. Each figure presents estimated schedules for the five selected samples. The estimated schedules have been divided into three study phases. The pre data collection phase includes the sample selection, instrument development, and recruitment and training of the field staff. The data collection phase includes all the field work and the supervision of the field work. The preparation and analysis of the data are included in the post data collection phase.

The estimates in the figures are subject to the same assumptions that were listed for figures D-1 and D-2. Most notably, the time periods listed for the data collection phase assume the completion of three institutions per week if the recipient sample is selected prior to the site visits and the completion of two institutions per week if the sample is selected on-site.

SELECTED SAMPLES	1	2	3	4	5
STUDY PHASE	2,500 Recipients 167 Institutions	3,900 Recipients 260 Institutions	5,500 Recipients 367 Institutions	7,100 Recipients 473 Institutions	8,700 Recipients 580 Institutions
Pre Data Collection	10 Weeks	10 Weeks	11 Weeks	11 Weeks	12 Weeks
Data Collection[1]	6 Weeks	9 Weeks	12 Weeks	16 Weeks	19 Weeks
Post Data Collection	8 Weeks	8 Weeks	8 Weeks	8 Weeks	8 Weeks
TOTAL	24 Weeks	27 Weeks	31 Weeks	35 Weeks	39 Weeks

D-8

FIGURE D-3-1A

RECOMMENDED TIMEFRAMES FOR COMPLETING DATA COLLECTION AT INSTITUTIONS BY SELECTED SAMPLES:

10 DATA COLLECTORS WITH SAMPLE SELECTED BEFORE SITE VISIT

[1] Assume each data collector completes an average of 3 institutions per week.

STUDY PHASE	SELECTED SAMPLES 1 2,500 Recipients 167 Institutions	2 3,900 Recipients 260 Institutions	3 5,500 Recipients 367 Institutions	4 7,100 Recipients 473 Institutions	5 8,700 Recipients 580 Institutions
Pre Data Collection	10 Weeks	10 Weeks	11 Weeks	11 Weeks	12 Weeks
Data Collection[1]	4 Weeks	6 Weeks	8 Weeks	11 Weeks	13 Weeks
Post Data Collection	8 Weeks	8 Weeks	8 Weeks	8 Weeks	8 Weeks
TOTAL	22 Weeks	24 Weeks	27 Weeks	30 Weeks	33 Weeks

D-9

FIGURE D-3-1B

RECOMMENDED TIMEFRAMES FOR COMPLETING DATA COLLECTION AT INSTITUTIONS BY SELECTED SAMPLES 15 DATA COLLECTORS WITH SAMPLE SELECTED BEFORE SITE VISIT

[1]Assume each data collector completes an average of 3 institutions per week.

STUDY PHASE	SELECTED SAMPLES 1 2,500 Recipients 167 Institutions	2 3,900 Recipients 260 Institutions	3 5,500 Recipients 367 Institutions	4 7,100 Recipients 473 Institutions	5 8,700 Recipients 580 Institutions
Pre Data Collection	10 Weeks	10 Weeks	11 Weeks	11 Weeks	12 Weeks
Data Collection[1]	3 Weeks	5 Weeks	6 Weeks	8 Weeks	10 Weeks
Post Data Collection	8 Weeks	8 Weeks	8 Weeks	8 Weeks	8 Weeks
TOTAL	21 Weeks	23 Weeks	25 Weeks	27 Weeks	30 Weeks

D-10

FIGURE D-3-1C

RECOMMENDED TIMEFRAMES FOR COMPLETING DATA COLLECTION AT INSTITUTIONS BY SELECTED SAMPLES

20 DATA COLLECTORS WITH SAMPLE SELECTED BEFORE SITE VISIT

[1] Assume each data collector completes an average of 3 institutions per week.

STUDY PHASE	SELECTED SAMPLES 1 2,500 Recipients 167 Institutions	2 3,900 Recipients 260 Institutions	3 5,500 Recipients 367 Institutions	4 7,100 Recipients 473 Institutions	5 8,700 Recipients 580 Institutions
Pre Data Collection	10 Weeks	10 Weeks	11 Weeks	11 Weeks	12 Weeks
Data Collection[1]	2.5 Weeks	4 Weeks	5 Weeks	6 Weeks	8 Weeks
Post Data Collection	8 Weeks	8 Weeks	8 Weeks	8 Weeks	8 Weeks
TOTAL	20.5 Weeks	22 Weeks	24 Weeks	25 Weeks	28 Weeks

D-11

FIGURE D-3-1D

RECOMMENDED TIMEFRAMES FOR COMPLETING DATA COLLECTION AT INSTITUTIONS BY SELECTED SAMPLES:
25 DATA COLLECTORS WITH SAMPLE SELECTED BEFORE SITE VISIT

[1]Assume each data collector completes an average of 3 institutions per week.

STUDY PHASE	SELECTED SAMPLES				
	1	2	3	4	5
	2,500 Recipients 167 Institutions	3,900 Recipients 260 Institutions	5,500 Recipients 367 Institutions	7,100 Recipients 473 Institutions	8,700 Recipients 580 Institutions
Pre Data Collection	7 Weeks	7 Weeks	7 Weeks	7 Weeks	7 Weeks
Data Collection[1]	8 Weeks	13 Weeks	18 Weeks	24 Weeks	29 Weeks
Post Data Collection	8 Weeks	8 Weeks	8 Weeks	8 Weeks	8 Weeks
TOTAL	23 Weeks	28 Weeks	33 Weeks	39 Weeks	44 Weeks

D-12

FIGURE D-3-2A

RECOMMENDED TIMEFRAMES FOR COMPLETING DATA COLLECTION AT INSTITUTIONS BY SELECTED SAMPLES:
10 DATA COLLECTORS WITH SAMPLE SELECTED ON-SITE

[1] Assume each data collector completes an average of 2 institutions per week.

STUDY PHASE	SELECTED SAMPLES 1 2,500 Recipients 167 Institutions	2 3,900 Recipients 260 Institutions	3 5,500 Recipients 367 Institutions	4 7,100 Recipients 473 Institutions	5 8,700 Recipients 580 Institutions
Pre Data Collection	7 Weeks	7 Weeks	7 Weeks	7 Weeks	7 Weeks
Data Collection[1]	6 Weeks	9 Weeks	12 Weeks	16 Weeks	19 Weeks
Post Data Collection	8 Weeks	8 Weeks	8 Weeks	8 Weeks	8 Weeks
TOTAL	21 Weeks	24 Weeks	27 Weeks	31 Weeks	34 Weeks

D-13

FIGURE D-3-2B

RECOMMENDED TIMEFRAMES FOR COMPLETING DATA COLLECTION AT INSTITUTIONS
BY SELECTED SAMPLES:
15 DATA COLLECTORS WITH SAMPLE SELECTED ON SITE

[1] Assume each data collector completes an average of 2 institutions per week.

STUDY PHASE	SELECTED SAMPLES 1 2,500 Recipients 167 Institutions	2 3,900 Recipients 260 Institutions	3 5,500 Recipients 367 Institutions	4 7,100 Recipients 473 Institutions	5 8,700 Recipients 580 Institutions
Pre Data Collection	7 Weeks	7 Weeks	7 Weeks	7 Weeks	7 Weeks
Data Collection[1]	4 Weeks	7 Weeks	9 Weeks	12 Weeks	15 Weeks
Post Data Collection	8 Weeks	8 Weeks	8 Weeks	8 Weeks	8 Weeks
TOTAL	19 Weeks	22 Weeks	24 Weeks	27 Weeks	30 Weeks

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FIGURE D-3-2C

RECOMMENDED TIMEFRAMES FOR COMPLETING DATA COLLECTION AT INSTITUTIONS BY SELECTED SAMPLES:

20 DATA COLLECTORS WITH SAMPLE SELECTED ON SITE

[1]Assume each data collector completes an average of 2 institutions per week.

STUDY PHASE	SELECTED SAMPLES 1 2,500 Recipients 167 Institutions	2 3,900 Recipients 260 Institutions	3 5,500 Recipients 367 Institutions	4 7,100 Recipients 473 Institutions	5 8,700 Recipients 580 Institutions
Pre Data Collection	7 Weeks	7 Weeks	7 Weeks	7 Weeks	7 Weeks
Data Collection[1]	3.5 Weeks	5 Weeks	7 Weeks	10 Weeks	12 Weeks
Post Data Collection	8 Weeks	8 Weeks	8 Weeks	8 Weeks	8 Weeks
TOTAL	18.5 Weeks	20 Weeks	22 Weeks	25 Weeks	27 Weeks

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FIGURE D-3-2D

RECOMMENDED TIMEFRAMES FOR COMPLETING DATA COLLECTION AT INSTITUTIONS BY SELECTED SAMPLES:
25 DATA COLLECTORS WITH SAMPLE SELECTED ON SITE

[1] Assume each data collector completes an average of 2 institutions per week.

APPENDIX D-1

LABOR REQUIREMENTS BY TASK AND LABOR CATEGORY

(In Person Hours)

TASK	LABOR CATEGORY			
	Senior Staff	Mid Level Staff	Junior Staff	Total
VARIABLE COST TASKS[1]				
Schedule Institution Site Visits		.2 hrs./ Institution	.2 hrs./ Institution	
Collect Data at Institutions[2,3]		13(20) hrs./ Institution		
Interview Students/Parents[4]			4 hrs./ Interview	
Supervise Institution Data Collectors	.2 hrs./ Institution	.3 hrs./ Institution		
Supervise Student/Parent Interviewers		.1 hrs./ Interview	.1 hrs./ Interview	
Code/Edit Institution Forms			5 hrs./ Institution	
Code/Edit Student/Parent Forms			.7 hrs./ Interview	
Release/Receive/File Secondary Forms[5]			.25 hrs./ Instrument	
Code/Edit Secondary Forms			.33 hrs./ Instrument	
FIXED COST TASKS				
Select Sample[3]	608 (500)	264 (150)	320 (100)	1,192 (750)
Develop Instruments	552	640	80	1,272
Recruit Institution Data Collectors	50	10	5	65
Recruit Student/Parent Interviewers	160	30	15	205
Train/Debrief Institution Data Collectors[6]	200	880	160	1,240
Train Student/Parent Interviewers[7]	260	520	8,440	9,220
Analyze/Report Findings	1,200	3,000	1,000	5,200
TOTAL FIXED HOURS[3]	3,030 (2,922)	5,344 (5,230)	10,020 (9,800)	18,394 (17,952)

APPENDIX D-1

LABOR REQUIREMENTS BY TASK AND LABOR CATEGORY

(continued)

[1]Marginal costs expressed in this table assume a recipient sample between 2,000 and 9,000 and an institution sample between 100 and 600.

[2]Assumes the following:

- An institution site visit includes 15 record reviews and a 45-minute interview.
- The same quantity of information is collected from each student record as was collected in the Stage One study.
- The institution sample is clustered geographically.
- The interviewers are not regionally based.

[3]Use number out of parenthesis if sample is selected from lists received from institutions prior to site visits. Use number in parenthesis if sample is selected on-site.

[4]Assumes the following:

- The same quantity of information is collected during each interview as was collected in the Stage One study.
- Two hundred interviewers conduct the interviews regardless of the sample size.
- The interviewers are regionally based.

The unit cost here is the completed student and parent interview; the number of completed interviews is calculated as follows:

Recipient sample x 2 x .87 (the percent of completes in the Stage One QC study)

[5]The number of secondary data collection instruments is calculated from the recipient size as follows:

Recipient sample x 1.8

[6]Includes 5 days of training and one day of defriefing for 10 interviewers. Total labor hours will increase slightly with a larger interviewing staff. Additional labor costs include planning, preparation of materials, and training by mid-level and senior staff.

[7]Includes 5 days x 200 interviewers for training. Additional labor costs include planning, preparation of materials, and training by mid-level and senior staff.

APPENDIX D-2

OTHER DIRECT COSTS BY TASK[1]

VARIABLE COST TASKS

Select Sample	
Telephone Time[2,3]	.5(.1) hrs. per institution @ $20 per hr.
Postage[3]	4(0) letters per institution @ 20¢ per letter
Develop Instruments	
Reproduction[4]	25 pgs. per instrument @ 7¢ per pg.
Schedule Institution Site Visits	
Telephone Time	.5 hrs. per institution @ $20 per hr.
Postage	3 letters per institution @ 20¢ per letter
Collect Data at Institutions	
Air Travel	$80 per institution
Car Rental[3]	1.6(2.5) days per institution @ $20 per day
Subsistence[3]	1.6(2.5) days per institution @ $60 per day
Postage	1 package per institution @ $5 per package
Interview Students/Parents	
Travel[5]	$9 per interview
Postage	1 package per interview @ $2 per package
Supervise Institution Data Collectors	
Telephone Time	.75 hrs. per institution @ $20 per hr.
Supervise Student/Parent Interviewers	
Telephone Time	.1 hr. per interview @ $20 per hr.

---

[1] All estimates of dollars and cents costs are based on 1982 prices.

[2] The $20 per hour rate assumes a WATS or similar system.

[3] Use number out of parenthesis if sample is selected from lists received from institutions prior to site visits. Use number in parenthesis if sample is selected on-site.

[4] Calculate the number of instruments to be printed as follows:

Recipient sample size x 4

[5] Includes air travel, car rental, and subsistence.

APPENDIX D-2

OTHER DIRECT COSTS

BY TASK

(continued)

VARIABLE COST TASKS (continued)

Code/Edit Institution Forms

Data Entry[6]	158 cards per institution @ 25¢ per card
Computer Time	.03 CPU hrs. per institution @ $550 per hr.

Code/Edit Student/Parent Forms

Data Entry	9 cards per interview @ 25¢ per card
Computer Time	.002 CPU hrs. per interview @ $550 per hr.

Release/Receive/File Secondary Forms

Postage[7]	80¢ per request form
Retrieval[8]	$1 per request

Code/Edit Secondary Forms

Data Entry	1 card per instrument @ 25¢ per card
Computer Time	.0001 CPU hrs. per instrument @ $550 per hr.

FIXED COST TASKS

Select Sample

Reproduction	25 copies of sampling plan @ 50 pgs. each @ 7¢/page	= $ 88
Computer Time	One hour @ $550/hr.	= $ 550

Develop Instruments

Local Travel	12 trips for field testing @ 40 miles each @ 22.5¢/mile	= $ 108

---

[6] 15 record abstracts @ 10 cards each plus 1 interview questionnaire @ 8 cards = 158 cards per institution.

[7] Calculate the number of request forms as follows:

Recipient sample x .5

[8] Calculate the number of request fees as follows:

Recipient sample x .33

APPENDIX D-2

OTHER DIRECT COSTS

BY TASK

(continued)

FIXED COST TASKS (continued)

Recruit Institution Data Collectors		
Advertising	6 advertisements @ $1,000/ad.	= $ 6,000
Air Travel	3 trips @ $370/trip	= $ 1,110
Car Rental	3 days @ $35/day	= $ 105
Subsistence	3 days @ $60/day	= $ 180
Telephone Time	20 calls @ .5 hrs./call @ $20/hr.	= $ 200
Recruit Student/Parent Interviewers		
Advertising	3 advertisements @ $1,000/ad.	= $ 3,000
Telephone Time	10 calls @ .5 hrs./call @ $20/hr.	= $ 100
Train/Debrief Institution Data Collectors		
Air Travel	10 interviewers @ 2 trips each @ $370/trip	= $ 7,400
Lodging	10 interviewers @ 6 nights each @ $45/night	= $ 2,700
Reproduction	50 copies of training manuals @ 70 pages each @ 7¢/page	= $ 245
Supplies	10 interviewers @ $15/interviewer	= $ 150
Train Student/Parent Interviewers		
Reproduction	250 copies of training manuals @ 250 pgs. each @ 7¢/page	= $ 4,375
Supplies	200 interviewers @ $2/interviewer	= $ 400
Supervise Institution Data Collectors		
Air Travel	20 trips @ $370/trip	= $ 7,400
Car Rental	40 days @ $35/day	= $ 1,400
Subsistence	40 days @ $60/day	= $ 2,400
Supervise Student/Parent Interviewers		
Air Travel	48 trips @ $370/trip	= $17,760
Car Rental	96 days @ $35/day	= $ 3,360
Subsistence	96 days @ $60/day	= $ 5,760

APPENDIX D-2

OTHER DIRECT COSTS
BY TASK
(continued)

FIXED COST TASKS (continued)

Analyze/Report Data

Computer Time	50 CPU hrs. @ $550/hr.	= $27,500
Reproduction	15 copies of Draft Analysis Plan @ 50 pgs. each @ 7¢/page	= $ 53
	15 copies of Final Analysis Plan @ 50 pgs. each @ 7¢/page	= $ 53
	15 copies of Draft Final Report @ 400 pgs. each @ 7¢/page	= $ 420
	50 copies of Final Report @ 400 pgs. each @ 7¢/page	= $ 1,400
Local Travel	40 trips @ 40 miles each @ 22.5¢/mile	= $ 360
TOTAL FIXED OTHER DIRECT COSTS		$94,577

APPENDIX D-3

GUIDELINES FOR ESTIMATING RESOURCE REQUIREMENTS FOR TELEPHONE INTERVIEWING OF STUDENTS AND PARENTS

LABOR

VARIABLE

1. Interviewing: 1.75 hrs./phone interview compared to 4 hrs./in-person interview
2. Coding/Editing: .5 hrs./phone interview compared to .7 hrs./in-person interview

FIXED

1. Training: 3,280 total hours to train interviewing staff (assumes 40 trainees) compared to 9,220 hours to train field interviewers (assumes 200 trainees)

OTHER DIRECT COSTS

VARIABLE

1. Interviewing: Telephone time replaces travel as the major cost item associated with interviewing: 1.5 hrs./interview @ $20/hr.
2. Supervision of Interviewers: No travel and long distance telephone time associated with supervision of telephone interviewers

FIXED

1. Survey Management System: $10,000
2. Training: Since there are fewer phone interviewers (assume 40) than field interviewers (assume 200) to train, reproduction and supply costs are lower:

Reproduction for training	$ 1,575
Supplies	$ 80